...T, MAY 21, 1936

FIRST AERO WEEKLY IN THE WORLD

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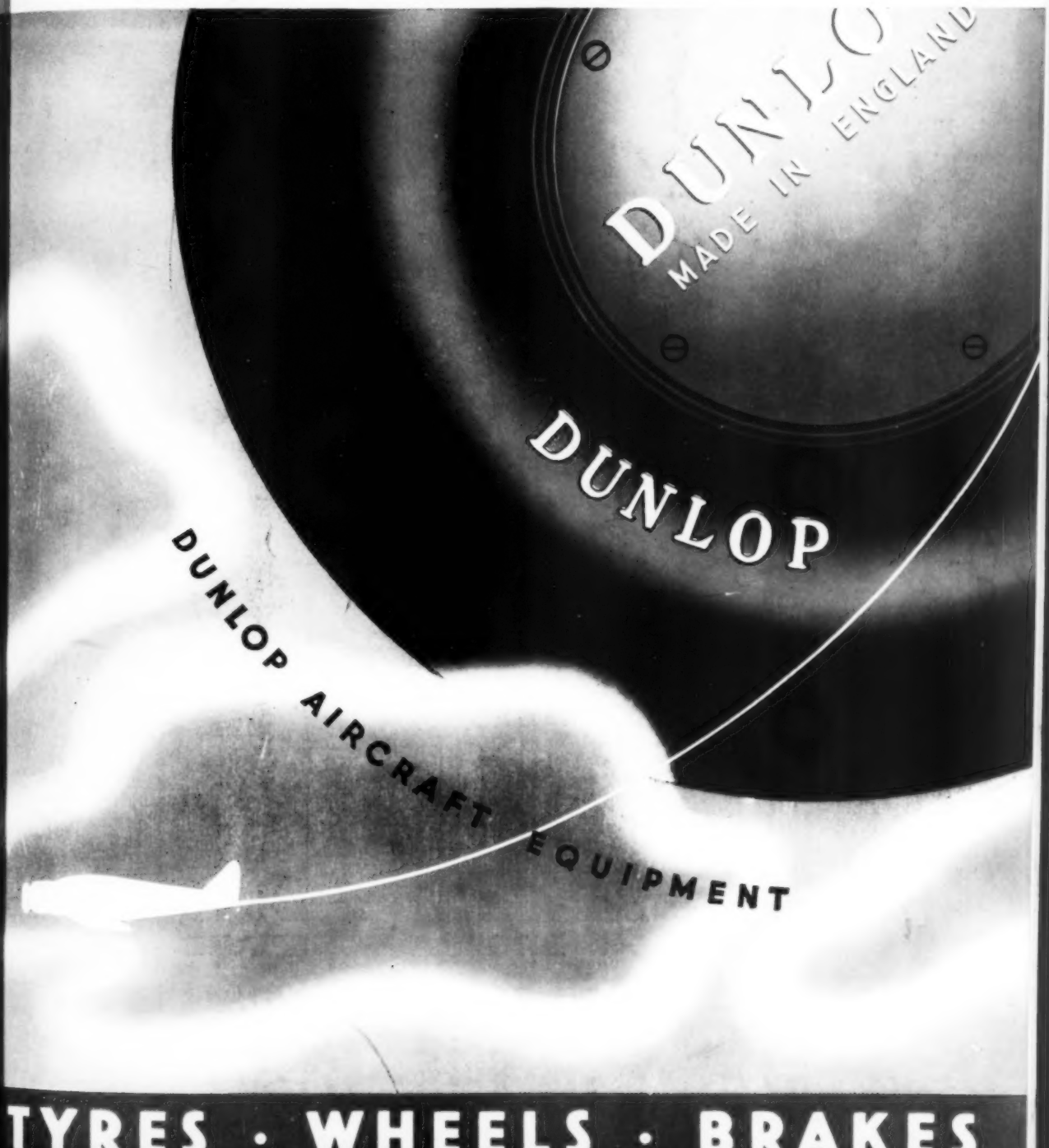
FLIGHT

6D.

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

COMMERCIAL AIRCRAFT AND AIRLINES



Type 130 *Transport-Bomber.*

ALL-METAL AIRCRAFT

Designed and Manufactured by

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (50 lines).

HERTFORD ST., COVENTRY.	GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2.	260, DEANSGATE, MANCHESTER, 3.	26B, RENFIELD ST., GLASGOW C.2.
Telegrams: Autocar, Coventry. Telephone: Coventry 5210.	Telegrams: Autopress, Birmingham. Telephone: Midland 2971.	Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.	Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 13 0. 6 months, 16s. 6d. 3 months, 8s. 6d.
Other Countries: Year, £1 13 0. 6 months, 17s. 6d. 3 months, 8s. 9d.

No. 1430. Vol. XXIX. MAY 21, 1936. Thursdays, Price 6d

"For Hire or Reward"

TO all who are in any way interested in commercial aviation, whether as operators, manufacturers of aircraft, engines and equipment, or as actual or potential users, this issue of *Flight* should have a special appeal. It deals with the different phases of what has now become an industry of very considerable magnitude and importance, and forms a useful work of reference in addition to its value as a review of the present position. In compiling this issue of *Flight* an endeavour has been made to cover the many aspects of commercial flying which together go to make a successful industry.

Beginning with the aircraft themselves, a review of British types discloses the fact that more than thirty different machines are available to the operator. They range in size from the 40-42-seaters used by Imperial Airways, Ltd., on the Empire routes, to the three-seaters suitable for taxi and charter work, and in power from more than 2,000 h.p. to 130 h.p., according to class and make. The larger types are, without exception, provided with four engines, so that the stoppage of one of the four will not result in a hurried forced landing. The small types are, somewhat naturally, single-engined machines, but it is noticeable that in the intermediate class the twin-engined type is almost universal.

Engine Layout

The three-engined machine has finally disappeared. There are several reasons for this. Many designers hold that the engine in the nose of the fuselage is barely worth while; it is as greedy of fuel as any other, and does not do its share of pulling, due to the fact that the slipstream behind it causes the fuselage to have extra drag. From the passenger's point of view the engine in the nose is a nuisance, as the battering of the slipstream is likely to cause "drumming"; lastly, without the central engine a very much better view can be provided for the pilot.

That there is no such thing as an "ideal" aeroplane for commercial aviation is brought out by the views of various operators published in this issue. It is worth noting that they do not all regard a very high speed as an absolute necessity. A high pay load and ability to climb out of fairly small aerodromes, or even fields, is held to be a considerable advantage, particularly for machines used on taxi and charter work. For regular air route operation, on the other hand, a good case is made out for a fairly high cruising speed. This is natural, since the one commodity which flying has to sell above all other means of transport is speed. It will, however, be interesting to see what the development of the near future will be. Already many townships and private firms are beginning to complain of the growing demands in connection with the size of aerodromes, and this rather than purely operating considerations may tend to limit the economical speed. The long routes will always need the highest speeds, and the traffic on them is likely to be such as to warrant large terminal airports. The subject of airport management and control is dealt with in a special article.

Air-cooling Predominance

An examination of the engines used in British commercial aircraft discloses the fact that without a single exception they are all air-cooled. Water-cooling has gone for the time being, but if, as some believe and hope, the diesel engine comes into use in large commercial aircraft, it will almost certainly be water-cooled.

The engines used in British commercial aircraft are of two general types, the four-cylinder or six-cylinder in-line, and the seven- or nine-cylinder radial. Up to 200 h.p. the in-line type is the most popular, but above that power the radial holds almost undisputed sway; not quite, because the so-called "H" type is there to challenge it and may become a good deal more popular someday than it is at the moment. The radial had a hard fight to establish itself.

Radio is already playing a very important part in commercial aviation, and its importance is likely to in-

crease in the future. In fact, it is no exaggeration to say that without radio there can be no commercial aviation worth the name. The radio industry has done good work in getting commercial aviation going; doubtless it will, in time, solve the even more difficult problems with which aviation is faced. The two are inseparably linked, progress in the one being dependent upon progress in the other.

Reliance on Radio

When commercial aviation becomes really commercial —at present it is rather in the position in which motor coach transport found itself after a few years of haphazard development—its dependence upon radio will be even greater than it is to-day. Density of traffic will demand 100 per cent. reliability, and the task of keeping track of the positions of hundreds of aeroplanes flying at different heights and on different courses seems at present so formidable as to be almost impossible. "Strata" flying, or the confinement of machines on certain courses to certain heights, may do much to increase safety between terminals, but the difficulties become really serious in the vicinity of airports, with machines arriving and departing in poor visibility.

Closely connected with the question of safety in flying is that of aircraft insurance, and *Flight* is able to offer its readers a contribution on this subject from an expert who has, perhaps, had longer experience than any other man in the country. The importance of insurance in relation to commercial aviation cannot be exaggerated, nor is it confined to commercial aviation. In fact, it is now compulsory that small privately owned aircraft must carry third-party insurance, and no matter how much decontrol is introduced in other directions, third-party insurance will remain, and it will in the end rest with the insurance world whether any particular type of aircraft flies or not. If no one will take on the insurance the machine cannot fly, and that is all there is to it.

The Future

Empire aviation is on the eve of great things. In fact, the next twelve months will be the most momentous in the history of flying. Upon the degree of success achieved by the new types of aircraft now being built will depend the rate at which the transport by air of mails and passengers between different parts of the British Empire will grow and expand. Regularity in operation will take its place alongside saving in time; one is little use without the other. The record of Imperial Airways hitherto is such that one is justified in looking to the future with a good deal of confidence.

A HUMAN HORSESHOE greets Mrs. Amy Mollison's Gipsy Six Percival Gull at Croydon on her triumphant return from the Cape. The record flight is dealt with on page 540 of this issue.

The Outlook

A Running Commentary on Air Topics

Theoretical or Practical?

A CLOSE study of the new Air Navigation Directions (A.N.D. 13) brings very few important changes to light, but one of these rather suggests that there has been a little double-track thinking. Apparently, because one or two novice entrants for previous second-class navigators' examinations managed handsomely to beat various other entrants with a very considerable air experience, the rules have been changed in such a way that the licence is available only to those with three hundred hours of experience *as pilot or navigator*.

It is perfectly reasonable, of course, that such a rule should be insisted on, but if the ability to answer all the theoretical questions in the examination is not sufficient to prove a navigator's qualifications, then what, quite, is the point of asking them? There are a number of very experienced and safe pilots, flying regularly on air routes by modern methods, who cannot for the life of them answer these questions, and who claim that the only valuable part of the present examination is that devoted to meteorology.

Since it is reasonable to suppose that a navigator can wield his slide-rule as efficiently in the air as on the ground, it can only be supposed that the demand for experience is a tacit admission that the theoretical knowledge is virtually useless. That being the case, why not give licences also to those pilots with a certain minimum number of airline hours to their credit?

Bravo!

WHEN Mrs. Mollison set out on her first attempt at beating the London-Cape Town record, and particularly when that attempt failed, there were many who shrugged their shoulders and said that obviously no woman pilot could hope to beat a veteran like Tommy Rose. She refused to be daunted by her initial set-back, and last Friday, when she landed at Croydon, she had confounded all the pessimists.

The fact that the machine and engine would be equal to the task was never doubted, and now Mrs. Mollison has proved that with the bodily comfort of a modern British aeroplane the physical strain is not nearly so great as it used to be. It will take a good man to beat Mrs. Mollison's splendid performance.

Empire Air Day

NEXT Saturday will be a field day for everyone desirous of satisfying his or her curiosity about this aviation business. Father, mother and the family—but particularly the family—are going to do themselves a world of good wherever they go, be it a two-machine club or a five-squadron R.A.F. station.

The Service has excelled itself in the making of preparations. A recent tour of typical units revealed to us real enthusiasm. Hard-boiled sergeant instructors are supervising arrays of guns and bombs with loving care. Pilots are bent on giving their visitors a "show" they will not easily forget. At least one aerodrome is having a real set-piece *à la* Hendon.

Just as much credit as the Service deserves is due to many a small club which, although unable to put up an air-circus programme, will do its bit toward making the day profitable not only for the R.A.F. Benevolent Fund, but for its visitors.

It is inevitable, of course, that as soon as young Herbert sees an aeroplane at close quarters he should want to caress it. In the process he may easily put his foot through a wing or spill his lemonade and sandwiches over the cockpit floor. Some scheme of unobtrusive supervision will prevent this; the supervisors, of course, will be ready to discourse on any aspect of flying which may happen to interest the supervised.

Given the right weather, May 23 should be a big day for everyone.

Air Transport Saves Days

THE Stockholm Aero Show has afforded *Flight* an excellent opportunity of making full use of the saving in time which air transport between Great Britain and Sweden affords. Owing to the fact that this week's issue is a special and greatly enlarged one devoted to a review of British commercial aviation, it was necessary to go to press one day earlier than usual. This meant that Monday morning was the latest time we could receive text and negatives from the Show. Our representatives travelled to Malmö by Swedish Airlines, which was as far as they could get until Bromma airport is opened, and thence by train to Stockholm. After being present at the opening and making a stand-to-stand tour of the exhibition, they sent the "copy" and photographs (which appear on pages 545-548) from Stockholm on Saturday evening; these were transferred to the Swedish company at Malmö early on Sunday morning, arrived at Croydon shortly after 2 p.m. on Sunday afternoon, the negatives were developed on Sunday evening, and prints awaited the Editorial staff when the office opened on Monday morning.

But for the existing air connection between the two cities, it would have been impossible to get this material to *Flight's* office in time to be included in this week's issue. When the Stockholm airport is working, the saving in time will be even greater, and it will be possible to send a letter one day and get a reply the next. By train and boat a letter at present takes three whole days to travel between Stockholm and London. There will thus be a saving of four days to the sender awaiting a reply.

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MODERN COMM
AIRCRAFT REV

Details of Over Thirty Types ... atility
"Commercial Efficiency" ... Main

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The Airspeed Envoy, with Siddeley Lynx or Cheetah, or with Wolseley Scorpio engines, has a high performance for a very modest power expenditure.

This picture of a scale model shows the new monoplanes now being built by Armstrong Whitworth for Imperial Airways.

AIRSPEED

THE latest version of the Airspeed A.S.6, the Envoy Series II, is a twin-engined low-wing monoplane of wood construction. According to the requirements of the operator, it can be equipped with six to eight seats for passengers. When fitted with two Wolseley Scorpio engines of 250 h.p. each it has a disposable load of approximately 2,100 lb. With six passengers the range is 720 miles at 171 m.p.h. at 62.5 per cent. power. At 75 per cent. power the cruising speed is 180 m.p.h., and the maximum speed is 200 m.p.h. By the use of the split trailing edge flaps the landing speed is 40-45 m.p.h. Total gross weight 6,300 lb. Makers: Airspeed (1934), Ltd., the Airport, Portsmouth.

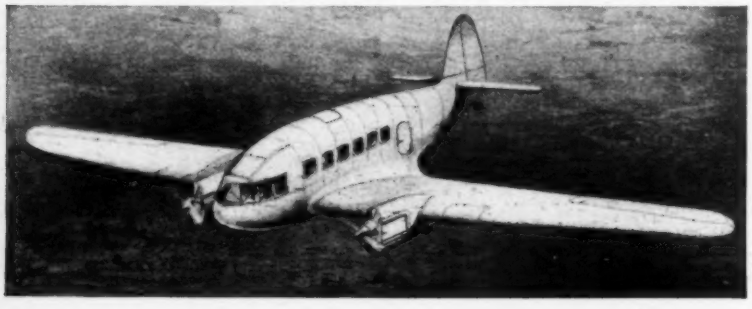
ARMSTRONG WHITWORTH

A NUMBER of A.W. Atalanta monoplanes have been in use by Imperial Airways for a number of years. Fitted with four Siddeley Serval engines of 340 h.p. each, the machine carries up to 20 passengers at a cruising speed of about 125 m.p.h. The gross weight is 21,000 lb. The Atalanta is now obsolescent, and will be replaced by the new four-engined all-metal high-wing monoplanes now being built at the Coventry works of the firm. These new machines will be fitted with four Siddeley Tiger engines of 800 h.p. each. Accommodation will be provided for 27 passengers in the daytime, and for 20 passengers at night. Makers: Sir W. G. Armstrong Whitworth Aircraft, Ltd., Whitley Abbey, Coventry.

The Armstrong Whitworth Atalanta with four Serval engines.

BOULTON PAUL

DESIGNED specifically for Imperial Airways, the Boulton Paul P.71 A is a twin-engined biplane of metal construction but with fabric covering. The machine is intended for feeder-line work, and has accommodation for 6-7 passengers. In addition it can carry a considerable quantity of mails or freight. Fitted with two Siddeley Jaguar engines of 460 h.p. each, the machine cruises at about 150 m.p.h. With a range of 420 miles the pay load is about 1,500 lb. The gross weight is 9,500 lb. If the whole of the pay load is devoted to passengers, the cabin is large enough to accommodate up to fourteen. The machine is of somewhat unorthodox design, and may be said to be developed from the Boulton Paul Mailplane. Note, for instance, the unusual fairings over the wheels of the undercarriage. Makers: Boulton Paul Aircraft, Ltd., Norwich.



An artist's impression of the Blackburn H.S.T.10. The engines are Napier-Halford Rapiers.

BLACKBURN

NEARING completion at the Brough works, the Blackburn H.S.T.10 is an all-metal low-wing monoplane with "stressed-skin" fuselage construction and the single-spar wing designed by the late Mr. F. Duncanson. This spar is a metal tube with corrugated walls, and the centre-portion serves as the petrol tank, so that the weight of separate tanks, and the space occupied by them, is saved. The machine is fitted with two Napier Rapier VI engines of 365 h.p. each at 4,000ft. The undercarriages retract into the engine fairings.

The total pay load varies from 1,320 lb. with a cruising range of 1,000 miles to 2,000 lb. at a range of 600 miles, The cruising speed is expected to be about 175 m.p.h., and the gross weight is 8,850 lb. Makers: Blackburn Aircraft, Ltd., Brough, East Yorks.

OMMERCIAL TREVIEWED

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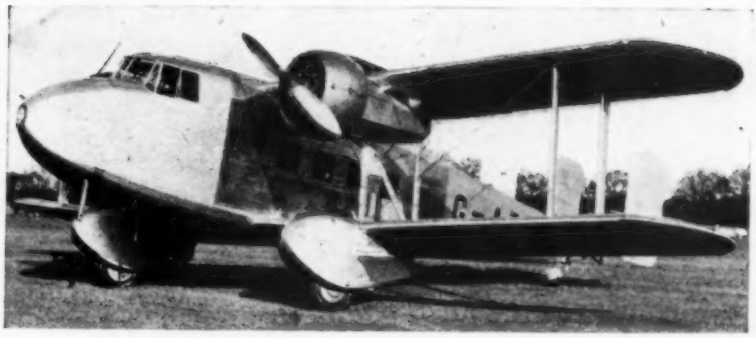
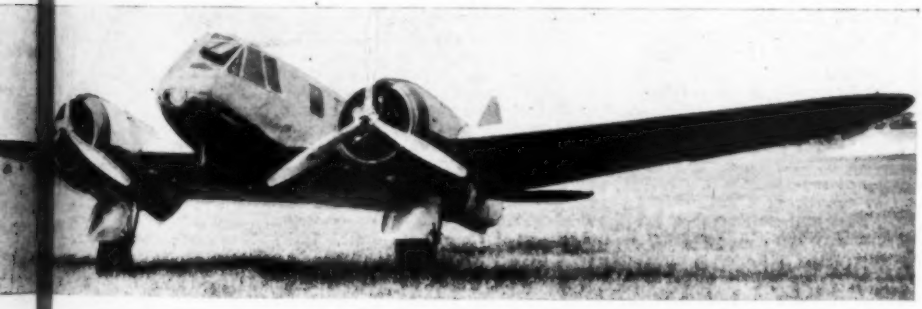


The Boulton Paul P.71 A has two Siddeley Jaguar engines.

B.A. Double Eagle has an unusual wing arrangement which gives the passengers a good view downwards. Two Gipsy Major engines are used.

BRISTOL

STRICTLY speaking, there is no Bristol commercial aeroplane on the market at the present time. The type 142 was bought by Lord Rothermere, who had the two Aquila sleeve-valve engines, for which it was originally planned, replaced by two Mercury engines of about 600 h.p. each. With these engines the performance is outstanding, and the 142 is probably the fastest commercial aeroplane in the world. As a result of the excellent performance of the 142, a modified version has been ordered by the Air Ministry and is to be used as a fast bomber. The machine, which has a span of 56 ft., is of very modern stressed-skin metal construction, and has flaps and retractable undercarriages. Makers: The Bristol Aeroplane Co., Ltd., Filton House, Bristol.



The Bristol 142, with two Mercury engines, is the fastest commercial aeroplane in the world.

B.A. AND B.M.A.

LITTLE can be said as yet about the Double Eagle, an entirely new type of somewhat unusual design, which is now undergoing its flight trials at Hanworth. The machine is a twin-engined six-seater, fitted with two 130 h.p. Gipsy Major engines. The wing roots are at a higher level than the wing proper, being swept up from the engine nacelles. As the cabin windows are entirely below the wing, the passengers can look down on the country over which the machine is flying. Retractable undercarriages are fitted, and the Double Eagle is expected to be quite fast in spite of its relatively modest power.

The same firm also manufactures a small single-engined type, the Eagle, very suitable for taxi and charter work. Of modern design, this is a low-wing cabin monoplane with Gipsy Major engine, and carries pilot and two passengers. (Picture on page 529.)

Makers: The British Aircraft Manufacturing Co., Ltd., Hanworth Aerodrome, Feltham, Middlesex.

Associated with the British Aircraft Manufacturing Co. is British Marine Aircraft, who are now building a large factory at Hamble, near Southampton, and who will build the Sikorsky S-42A flying boat under licence.

This machine has achieved considerable success in America. When fitted with four Pratt and Whitney Hornet engines, it carries a pay load of 6,755 lb. at a cruising speed of about 170 m.p.h. and the range with this load is approximately 1,200 miles. The S.-42A is a strut-braced monoplane with wing-tip floats.

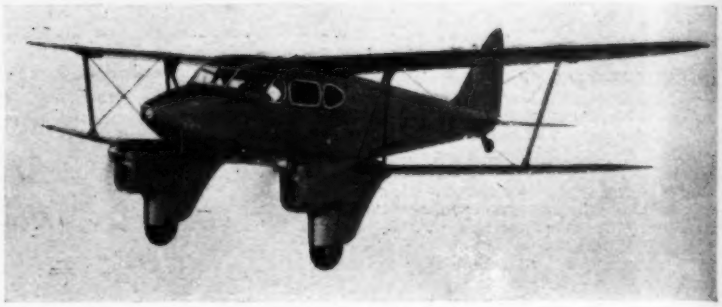
CESSNA

SUITABLE for taxi-work, the Cessna C.35 is a four-seater monoplane of American manufacture. Sole agents in this country are Surrey Flying Services, Ltd., Croydon Airport, Surrey. With a Warner Super-Scarab of 145 h.p., the Cessna has a top speed of about 160 m.p.h., and it cruises at 145 m.p.h., which is remarkable for the power and load carried. (Picture on p. 529.)

The D.H. 89 Rapide.

On the left, the D.H. 86 from which is developed the 86A, which has V.P. airscrews and Series II Gipsy Six engines.

Below, the D.H. Dragonfly, which seats pilot and four passengers. It cruises at about 130 m.p.h.



DE HAVILLAND

FOR many years the De Havilland company has specialised on civil aircraft to the complete exclusion of military types, and a number of types are available, all, it may be said, developed from the Dragon, which was the first civil machine to make unsubsidised aviation possible.

The D.H.86A is the latest version of the famous express air liner. It is fitted with V.P. airscrews driven by four Series II Gipsy Six engines. The gross weight is 11,000 lb., and the pay load is rather more than 2,100 lb. The operating speed at 7,000ft. is 160 m.p.h. The cruising range is about 750 miles, and seating accommodation can be provided for up to fourteen passengers, according to the range required.

The D.H.89 Rapide is a twin-engined biplane, resembling the 86 in its general lines. It is a small express air liner fitted with two 200 h.p. Gipsy Six engines. Cabin accommodation varies from five to ten passengers, according to requirements, and for a range of 580 miles the pay load is 1,160 lb.

A smaller version of the Rapide is the D.H. Dragonfly, which has been described as a "Little Airliner." A twin-engined biplane like the Rapide, the Dragonfly has two Gipsy Major engines of 130 h.p. each, and there is accommodation for pilot and four passengers. The tare weight with standard equipment is 2,500 lb., and the gross weight 4,000 lb., leaving a disposable load of 1,500 lb. With 85 gallons of fuel the range is 885 miles at a cruising speed of 127-130 m.p.h.

Most of the De Havilland types can be obtained with a float undercarriage, when the pay load and performance are slightly reduced. Makers: The De Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts.

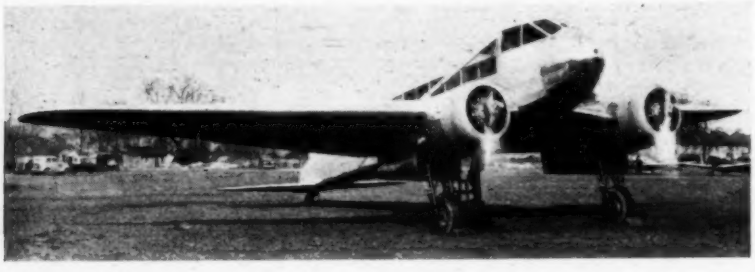
GENERAL AIRCRAFT

MONOSPAR construction is associated with all the machines produced by this firm. It consists in a type of wing construction using a single spar, strong enough to take the bending loads, but reinforced by a form of spiral bracing which resists torque.

The latest machine to be introduced is the S.T.18, a high-performance ten-passenger monoplane of metal construction but with fabric covering. Power is supplied by two 400 h.p. Pratt and Whitney Wasp Junior engines, driving Hamilton V.P. airscrews. As it was fully described and illustrated in *Flight* of May 7, it will suffice to recall that the machine is of somewhat unorthodox design, with back-swept wings. Cruising at approximately 190 m.p.h., the *Croydon*, as the first of the type is called, has a range of about 650-700 miles.

The Monospar Standard S.T.25 is a smaller type, with accommodation for pilot and four passengers. It is powered by two Pobjoy Niagara engines of 90 h.p. each, and cruises at 118 m.p.h. at which speed the range is approximately 500 miles. (Picture on p. 529.)

Makers: General Aircraft, Ltd., Hanworth Aerodrome, Feltham, Middlesex.

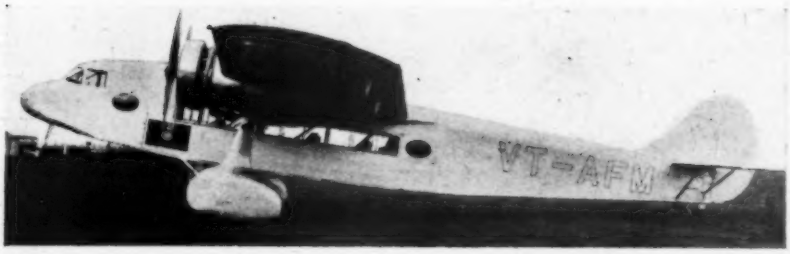


H.P.

THE only commercial aeroplane of Handley Page manufacture now in use is the H.P.42 Hannibal. This machine, which does much of the work of Imperial Airways, is a four-engined biplane, with the 550 h.p. Bristol Jupiter engines. The machine carries up to forty passengers at a cruising speed of 95 m.p.h. The comfort in the cabin is of a very high order. Makers: Handley Page, Ltd., Cricklewood, London.

Above, the General Aircraft S.T.18 *Croydon*, which cruises at about 190 m.p.h.

On the right, the Handley Page H.P.42, which has done excellent work for Imperial Airways.



The Avro 642 (four Siddeley Jaguars) is shown on the right. This machine is also available as a twin-engined type. Below is the Avro 652, a smaller machine, fitted with Siddeley Cheetah engines of 310 h.p. The Avro Anson military machine was developed from this.

HESTON

REMARKABLE for the comfort and quiet of its cabin, the Heston Phœnix was designed mainly for the private owner and for charter work. (Picture on p. 529.) With a 200 h.p. Gipsy Six engine, it carries pilot and five passengers at a cruising speed of about 125 m.p.h., and has a range of 500 miles at cruising speed. It was on a machine of this type that Mr. Melrose recently flew to Australia.

With a tare weight of 2,000 lb., the Phœnix has a disposable load of 1,300 lb., or 6.5 lb. for every horse power, so that the machine is very economical to operate. Makers: Heston Aircraft Co., Ltd., Heston Airport, Hounslow, Middlesex.

The Saro Cloud (two Rapiers) as an amphibian.

PARNALL

A VERY wide speed range is one of the features of the Heck, a low-wing cabin monoplane of wood construction. The wide speed range is a result of the extensive use of slots and flaps, which give the machine a low landing speed in spite of a relatively high wing loading. The machine will be available shortly with two alternative power plants, the Gipsy Six and the Wolseley Aries. Normally the machine carries pilot and two passengers, but accommodation can be provided for a third passenger if desired. (Picture on p. 529.) Makers: Parnall Aircraft, Ltd., Yate, Glos.

PERCIVAL

HITHERTO Capt. E. W. Percival has confined himself to the smaller types of civil aircraft, suitable for private owners and for taxi and charter work. He entered the field some years ago with a low-wing cabin monoplane of wood construction, and has been so successful with the type that he has adhered to it, although each year an improved version has appeared. By her recent flights, Mrs. Mollison has made the Gull famous. The Vega Gull is a slightly enlarged version, carrying pilot and three passengers at a cruising speed of about 150 m.p.h. The top speed is 170 m.p.h. and the landing speed, by the use of trailing edge flaps very simply operated by a "brake" lever, is only about 45 m.p.h. The engine fitted is the Gipsy Six, but the machine is also available with the Gipsy Major of 130 h.p., when the performance is, of course, slightly lower. The disposable load is 1,175 lb., and the normal range at cruising speed 620 miles. Makers: The Percival Aircraft Co., 20, Grosvenor Place, London, S.W.1.

PHILLIPS AND POWIS

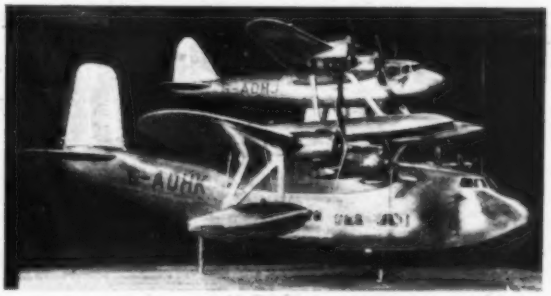
NEARING completion at the Reading works of Phillips and Powis, the Peregrine will be the first twin-engined machine to be produced by that firm to the designs of Mr. F. G. Miles. Of wood construction like previous Miles designs, the Peregrine is a low-wing cantilever cabin monoplane, fitted with two Gipsy Six engines and retractable undercarriage. Seating accommodation will be provided for two pilots and six passengers, but the machine will also be available as a training type for pilots of larger commercial and military aircraft.

The all-up weight will be 5,200 lb., with a disposable load of 2,200 lb. It is expected that the Peregrine will cruise at about 165 m.p.h. and have a range with full pay load of about 600 miles.

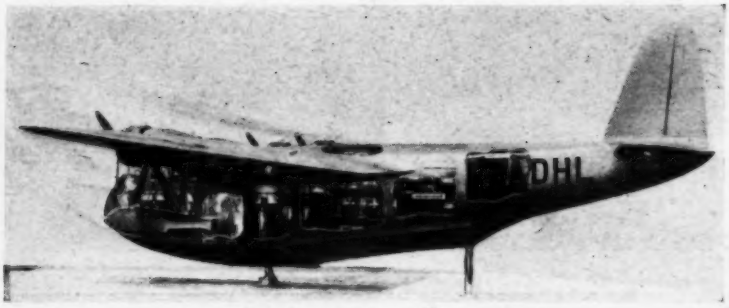
The Miles Merlin is a smaller type, suitable for taxi work, and carries pilot and four passengers on a Gipsy Six engine at a cruising speed of about 140 m.p.h. (Picture on p. 529.) Makers: Phillips and Powis Aircraft, Ltd., Woodley Aerodrome, Reading.

POBJOY

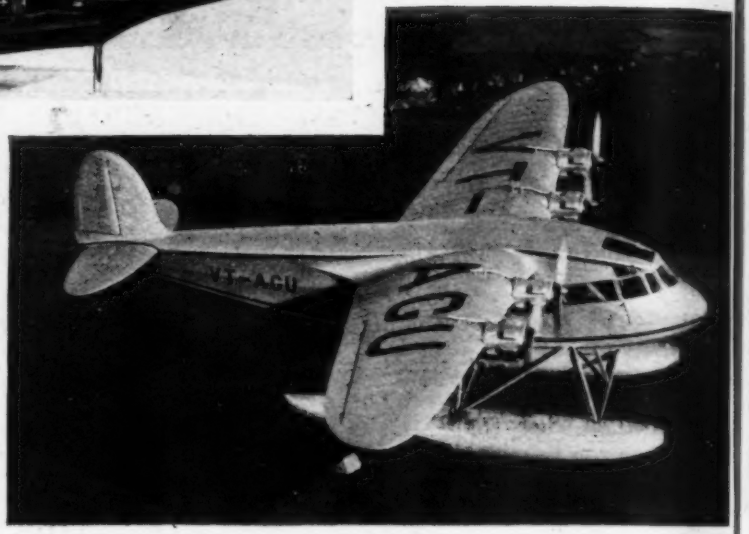
ORIGINALLY designed and built by Short Brothers, the Scion is now manufactured by Pobjoy Airmotors and Aircraft, Ltd. The machine is a very economical twin-engined high-wing monoplane, fitted with two Pobjoy 90 h.p. Niagara engines. Normally it carries pilot and five passengers at a cruising speed of 116 m.p.h. The range is 390 miles. The machine is also available as a seaplane, and in spite of the low power it takes off well. (Picture on p. 529.) Makers: Pobjoy Airmotors and Aircraft, Ltd., Rochester Aerodrome, Kent.

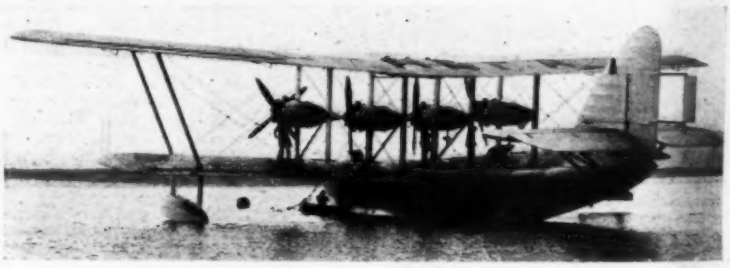


Mercury and *Maia*, the Short-Mayo Composite Aircraft



A Short Trio: On the left, a scale model of the Empire flying boat (four Pegasus X). Below, the Scion Senior with four Pobjoy Niagara engines, and in the lower photograph, the Scipio with four Bristol Jupiters.





A. V. ROE

TWO types of aeroplane of the commercial class are manufactured by the famous Avro firm: the type 642 and the type 652.

The 642 is a high-wing monoplane with wooden wing and welded steel tube fuselage. The machine is available with a variety of power plants, and even as a twin-engined or a four-engined type. The cabin accommodation varies from 12 to 16 passenger seats, with a crew of two. When the machine is fitted with two Siddeley Jaguar engines the cruising speed is 135 m.p.h., and the range 400 miles.

One of the 642s is used in India for conveying the Viceroy.

A considerably smaller machine, the Avro 652 is a low-wing monoplane of modern design with retractable undercarriage. The normal passenger capacity is six, and when fitted with two Siddeley Cheetah IX engines of 310 h.p. each, the machine cruises at 165 m.p.h. For a maximum gross weight of 7,500 lb., the pay load is 1,300 lb. The 652 has been supplied to Imperial Airways and to the Egyptian government, and from it has been developed the Avro Anson military type, of which large numbers have been ordered for the R.A.F.

Photographs of these two Avro machines will be found on the previous page.

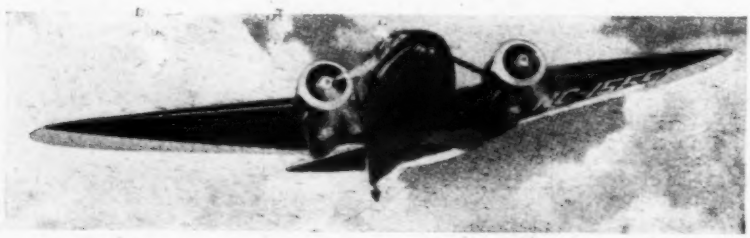
Makers: A. V. Roe and Co., Ltd., Newton Heath, Manchester.

SARO

AVAILABLE both as an amphibian and as a plain flying boat, the Saro Cloud is a twin-engined monoplane with wooden wing and Alclad hull. When fitted with the Napier Rapier engines, the machine has seats for eight passengers and a crew of two, and cruises at 112 m.p.h. The range is about 450 miles. The Cloud can also be supplied fitted with two Siddeley Serval engines of 340 h.p. each.

S. E. Saunders, before the firm became Saunders-Roe, made rather a speciality of amphibian flying boats. The advantages of being able to operate from land as well as water are obvious. The wheel undercarriage, however, reduces the payload somewhat.

A smaller version, Cutty Sark, is fitted with two Gipsy Major engines and seats four, including pilot. It cruises at 90 m.p.h. and has a range of 300 miles. Makers: Saunders-Roe, Ltd., Cowes, Isle-of-Wight.

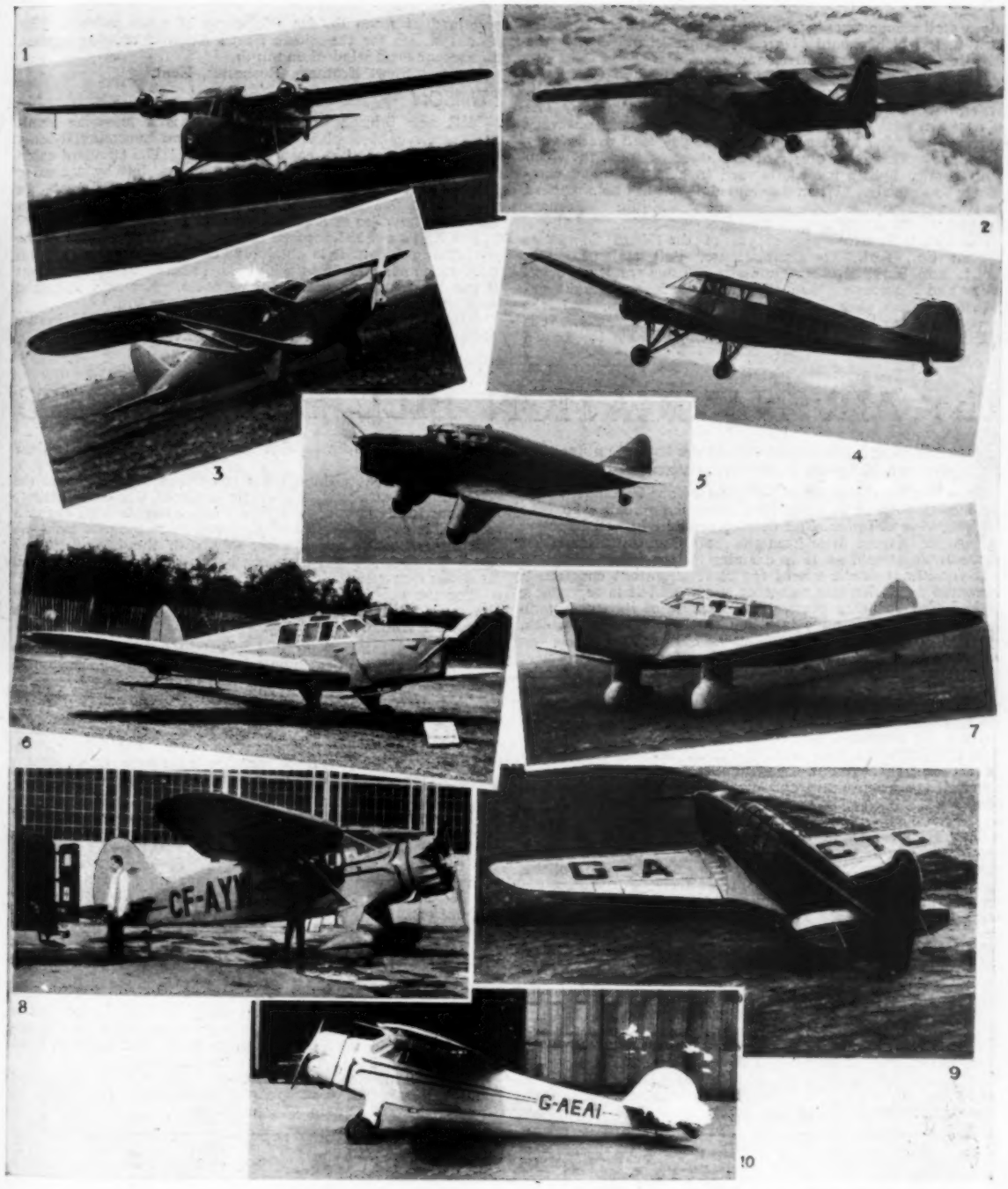


A Fast American: The Stinson Bimotor, the British agency for which is held by Brian Allen Aviation Ltd.

SHORT

DURING the past few years an imposing range of commercial aircraft has emerged from the Short works on the banks of the Medway. The firm may be said to have begun the series with the Calcutta flying boat first produced some seven years ago, examples of which are still in service. Then came the Kent, or as it is now known, the Scipio class, a four-engined biplane flying boat of all-metal construction, fitted with four 555 h.p. Bristol Jupiter engines placed abreast in the gap between the wings. This machine has seating accommodation for eighteen passengers, and weighs 32,000 lb. when loaded. It cruises at about 105 m.p.h. The tare weight is 20,500 lb. A landplane version of the Scipio, the Scylla, has exactly the same superstructure and engine arrangement, but a fuselage and undercarriage instead of the hull. It carries forty-two passengers at a cruising speed of 105 m.p.h.

Of smaller commercial types, Shorts produced quite recently the Scion Senior, a four-engined high-wing monoplane available either as a landplane or as a twin-float seaplane. Four Pobjoy Niagara engines of 90 h.p. are fitted on the leading edge of the wing. As a seaplane the Scion Senior carries up to ten passengers, has a cruising speed of 115 m.p.h., and a range of 400 miles



In addition to the larger commercial and feeder-line aircraft described on the previous pages, the smaller machines shown above are available. They are: (1) the Short Scion (Pobjoy engines); (2) the De Havilland Leopard Moth (Gipsy Major); (3) the Heston Phœnix (Gipsy Six); (4) the Monospar Standard S.T.25 (Pobjoy); (5) the Miles Merlin (Gipsy Six); (6) the B.A. Eagle (Gipsy Major); (7) the Percival Vega Gull (Gipsy Six); (8) the Stinson Reliant (Lycoming engine) as an air ambulance; (9) the original Parnall Heck (Gipsy Six); (10) the Cessna C.3 (Warner Super-Scarab)

when a smaller number of passengers is being carried.

Most interesting of the Short range of aircraft are the Empire flying boats, the first of which will be flying soon, and the Short-Mayo Composite aircraft.

The Short Empire boat is a four-engined monoplane of all-metal construction, with four Bristol Pegasus X engines mounted on the leading edge of the wing. The hull is very deep, so that it has been possible to work in two decks: the upper for the crew and the lower for passenger accommodation. Bunks are to be carried so that the twenty-four seats of the daytime accommodation can be transformed into sleeping accommodation for sixteen passengers at night. As the first machine has not yet flown no actual performance figures exist, but it is thought that the machine will be able to cruise at 150-160 m.p.h. The normal range will be about 700-750 miles, but special versions will have no passenger quarters,

only a mail compartment, and the weight will be made up by extra fuel, which should give a range sufficient to fly the Atlantic *via* the Azores and Bermuda.

Of very original conception is the Short-Mayo Composite aircraft, which comprises an upper component, fairly small, carried on the wings of a fairly larger lower component. The object is to enable a relatively small and therefore not very expensive machine to carry a reasonable pay load over a very long stage. The extra power of the lower component, which is, of course, lightly loaded, is used to help the upper component into the air. When the desired height has been reached the two separate, the upper component heading for its destination and the lower returning to the base.

The idea is due to Major Mayo, of the Mayo Composite Aircraft Co., Ltd., Quadrant House, Pall Mall, London, S.W.1, and Short Brothers undertook some of the detail design and the construction. The upper component is a twin-float monoplane with four Napier Rapier engines, and the lower is a flying boat very similar to the Empire boats. It is estimated that the upper component will be able to carry a pay load of 1,000 lb. for a distance of 3,500 miles. This should suffice for the direct North Atlantic crossing against an average head wind of 60 m.p.h.

Makers: Short Brothers, Rochester, Kent.

STINSON

THE new Stinson bimotor model B is a low-wing semi-cantilever monoplane, powered by two Lycoming R-680-5 engines giving 360 h.p. each for cruising. The standard cabin lay-out caters for pilot and five passengers, but by squeezing a little, three can be accommodated in the rearmost seat. In addition to five passengers, the machine carries fuel for a range of 720 miles at a cruising speed of 162 m.p.h.

The Stinson multi-purpose Reliant is the 1936 model of the well-known type. It is obtainable as a landplane, as a twin-float seaplane, and fitted with skis. According to equipment it can be used for a variety of purposes. Normally it carries four passengers at a cruising speed of 135 m.p.h.

The European distributors of the Stinson machines are Brian Allen Aviation, Ltd., Airport of London, Croydon.

The AIR NAVIGATION BILL and SUBSIDIES

THE following letter on an important topical subject has been received by the Editor from Viscount Elibank;—

Sir,—The Air Navigation Bill now before Parliament is a measure of such importanse that those individuals who take the long view in Imperial air development might well be urged to turn aside for a little from the more doubtful fascinations of the International arena to examine its provisions.

It is without doubt one of the most important enactments presented to Parliament in recent years, and it is regrettable to find that so many persons are unaware of its true significance. It is in the same tradition as the enactments which, adjusted to the personal qualities of our seamen, made our merchant navy the finest in the world. Here is an instrument so fashioned that in course of time it should give us similar prestige in the air. But there is a danger to its effectiveness in the constant clamour one hears against the wise policy of the Government in not putting its subsidies into more than a few selected concerns.

In my judgment, and in all the circumstances, it would be an act of folly to split the available subsidy funds among concerns operating either now or prospectively over the same routes merely on the ground that it is a good thing to encourage competition. I agree that monopolies, as a general rule, are bad, but, in the development of our Imperial air communications, unity of control and administration is essential for efficiency, for the planning of long-term policies, for the negotiation of concessions with overseas countries, and for the most economic employment of public funds in the form of subsidies. In the case of the two organisations already selected for subsidy payments, namely, Imperial Airways and British Airways, these conditions are amply fulfilled. On the other hand, a policy of piecemeal subsidy payments to every company with space on aeroplanes to sell would be to fritter away our air future.

It may be urged in the course of debates on the Bill that the subsidies paid to British concerns are too heavy. I have been looking into some comparative statistics, which show that, in addition to being on a diminishing scale, the British subsidy amounts to only 3s. 6d. per ton-mile compared with 4s. 10½d. in Germany, 8s. 11d. in France, and 12s. 5d. in Italy. The subsidies to American airways are on an even larger scale, and this raises another point to which I should like to draw attention.

How is it that although the conditions of flying over the United States, which is a single national unit, are entirely different from those of flying over many countries as our own services have to do—obviously a much more complex task—we are always compared unfavourably with the United States? Such comparisons will certainly be made again when the Bill is under discussion.

For the benefit of those who may take this point of view let me quote this passage from a recent report of America's Federal Aviation Commission:—

> "The total of original privately financed investments in the aeronautical industries . . . appears to have been $550,000,000. To that we have added a further $90,000,000 for the investment in municipal airports. Much of the investment was disastrously reckless. . . . It appears, in short, that financial disaster is in the making for a large part of the present air transport system. Whether it makes its appearance in six weeks or six months or longer, we cannot see how it can be postponed indefinitely."

It seems, therefore, that there is a good deal to be said for the much-abused British policy, embodied in the Air Navigation Bill, of proceeding with a courage tempered by caution. It would be a disaster if, after all these years of patient development and far-sighted planning, we allowed ourselves to be influenced in the shaping of this Bill by any other considerations.

ELIBANK.

House of Lords,
London, S.W.1.

Call of the Clyde

THE Scottish National Development Council is appealing to aircraft manufacturers to study the possibilities of establishing factories on the raid-remote south-west coast of Scotland, and on the Clyde Estuary in particular.

Very full information regarding sites, factories for sale, power and fuel supplies, etc., are obtainable from the Council at 19, Blythswood Square, Glasgow, C.2.

Forthcoming Events

May 15-June 1. Stockholm Aero Show.
May 23. Empire Air Day.
May 27-June 4 Austrian Aero Club: Whitsun Tour.
May 29-June 2. Swiss Aero Club: Whitsun Tour.
May 30-June 1. Isle of Man Air Races
May 30-June 1. Aero Club de Provence: Marseilles Week-end.
May 30-June 2. Yorkshire Gliding Club. Open Meeting and Competitions.
June 6. Official Opening of Gatwick Airport.
June 6-14. Czechoslovakia Aero Club: Tour
June 7. London Air Park Club: Hanworth Garden Party.
June 13-14. Opening of Brighton, Hove and Worthing Airport International Rally.
June 27. Royal Air Force Display, Hendon.
July 2-5. Belgian Aviation Clubs: Tour Aerien Belgique.
July 10 and 11. R.Ae.C.: King's Cup Race.
July 18. Portsmouth Aero Club: Isle of Wight Race.
July 23-26. R.Ae.C.: Week-end Aerien.
August 1. Cinque Ports Club: Folkestone Trophy Race.
August 1-3. Yorkshire Gliding Club: Open Meeting.
August 2-15. Yorkshire Gliding Club: Instruction Camp.
August 3. Ramsgate Airport: Pou-du-Ciel Race.
August 8. Reading Aero Club: Northesk Cup Competition for Women Pilots.
August 15-30. Yorkshire Gliding Club Open Meeting and Competitions.
August 22. Midland Aero Club: "At Home" and Contact Air Race.
August 29-30. Cinque Ports Club: International Rally and Wakefield Cup Race.
August 30. Gordon Bennett Balloon Race, Poland.
September 5-6. Aero Club of Hungary: Week-end Aerien.
September 12. London Aeroplane Club: Hatfield Garden Party.
September 13. Aero Club de France: Coupe Deutsch Race.
September 20. London Air Park Club: Display.
October 25. Aero Club de France: Saigon Race.
November 13-29. Fifteenth International Aero Exhibition, Paris.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

TWENTY-ONE : *Scylla* was chartered by Mr. Leslie Irvin, of parachute fame (seen on the left), to fly his daughter's twenty-first birthday party guests to Paris last week.

THE anti-aircraft demonstration which was to have been held in Battersea Park on May 24 has been cancelled owing to objections by the L.C.C.

A Curtiss V.P. airscrew is on test in an R.A.F. Pegasus-Vildebeest.

Canopus, the first of the Short Empire boats, is expected at Felixstowe in a few weeks.

The Zeppelin *Hindenburg* passed over the South of England last week on her way from America.

A very large Dornier four-engined flying boat, known as the Do.20, is being built. It will cruise at 150 m.p.h. for 3,000 miles.

Miss Naomi Heron-Maxwell, best known in this country for her parachute descents, is learning to glide at Greisheim, Germany.

Mr. H. L. Brook, who is flying a 36 h.p. Hillson Praga to the Cape, reached Juba, East Africa, on Saturday. He left England on May 6.

Recruits in Turkey are to be trained in parachute descents from the famous Bayazid (Fire Tower) at Istanbul. To avoid a climb of 366 steps a lift is being installed.

By experimenting with sounding balloons a Russian professor, P. A. Molchanov, has observed that the upper layers of the Arctic air remain warmer than the lower. The data will prove useful in planning Arctic air routes.

Twenty-five Years Ago

(From "Flight" of May 20, 1911.)

One of the first sights which greeted the German Emperor as the Imperial yacht *Hohenzollern* neared Sheerness was a couple of aeroplanes piloted by two of the naval officers who have undergone their training at Eastchurch. They did not approach very close to the Imperial yacht, but were close enough to be clearly observed.

Pou Breaks a Blood Vessel

An attempt by Mr. Claude Oscroft, of the Aero 8 Club, Ashingdon, Essex, to make a cross-Channel *Pou* flight last week-end was frustrated by a broken oil pipe.

Fishy!

Under the provisions of a recent barter agreement between Norway and Italy four Breda training aircraft have been traded for supplies of Norwegian herrings and *klip-fish*. The machines will be delivered to the Norwegian Navy.

Hangers-on

The failure of a transport machine to rise from Bucharest aerodrome caused the pilot to leave his cockpit and inspect the machine. He found two shabby urchins clinging to the tail. Unable to stow away in the cabin, they had taken up their precarious perch unobserved.

Lake Tsana : Seaplane Base

It is reported that only a few weeks after their occupation of the Lake Tsana territory the Italians started a seaplane service between Massowa, on the Red Sea, and Laka Tsana. The lake, it is claimed, may become a seaplane base of no little importance, for civil as well as for military purposes, in the course of the next few years.

FULL WAR LOAD : Empire Air Day visitors will see how a Martlesham test pilot arrays himself before a high-altitude flight. Points to notice are the aneroid and note-pad. (*Flight* photograph.)

AT HOME and ABROAD

Imperial Airways photograph.

British Internal and External Air-Line Developments: The New Empire Plans: Important Extensions

EVERY year, without fail, the remark is made that "if commercial flying does not go ahead now, it never will," and every year, without fail, the business goes on, new companies arrive and perhaps fade away, and established companies move a little nearer to the millennium when they will *all* pay their way. Although nobody noticed it, the year 1934 was one of the most important of any from the air transport point of view, for the very excellent reason that at least one unsubsidised operator ran regular services at a profit.

During the past year the various problems involved in the planning of our internal routes have been somewhat overshadowed by the magnificence of the Empire and Transatlantic projects. We still await the findings of the Maybury Committee, and the operators still await the discovery of a genuinely internal route over which a profitable number of persons are desirous of transportation. For the present the holiday and sea-crossing services remain as the most useful on the internal air map. In competition with a highly developed system of railroads, the other services can only be really profitable if they are run either at a very high speed and with tube-like frequency, or with machines which provide the maximum of comfort coupled with an unusually high payload.

Competition

Although the publication of Railway Air Services' plans can hardly have come as a complete surprise to anyone who has watched developments, these certainly suggest that the battle for internal traffic has now started in real earnest—with the scales weighted heavily in R.A.S.'s favour. For the rest, British Airways have multiplied their services and left the London-Belfast route; Blackpool and West Coast Air Services are using D.H. 86s on their Irish Sea services (which have also been multiplied); Northern and Scottish have extended to Skye and North and South Uist; Jersey Airways have laid out an aerodrome at Alderney, and are operating between Plymouth and Jersey; Highland Airways should soon be running to Shetland and between Glasgow, Perth, and Inverness; Aberdeen Airways plan to go south to Hull and north to Shetland; Crilly Airways, who have a particularly useful travel voucher scheme, now reach Plymouth; and the balance of the companies carry on with an unshakable belief that the public will eventually use the air for all fast journeys.

Meanwhile, the charter companies, and, in particular, those with regular contracts from newspapers and others, continue to be the only people who are able to gauge their returns with reasonable accuracy—for the simple reason that they fly to order.

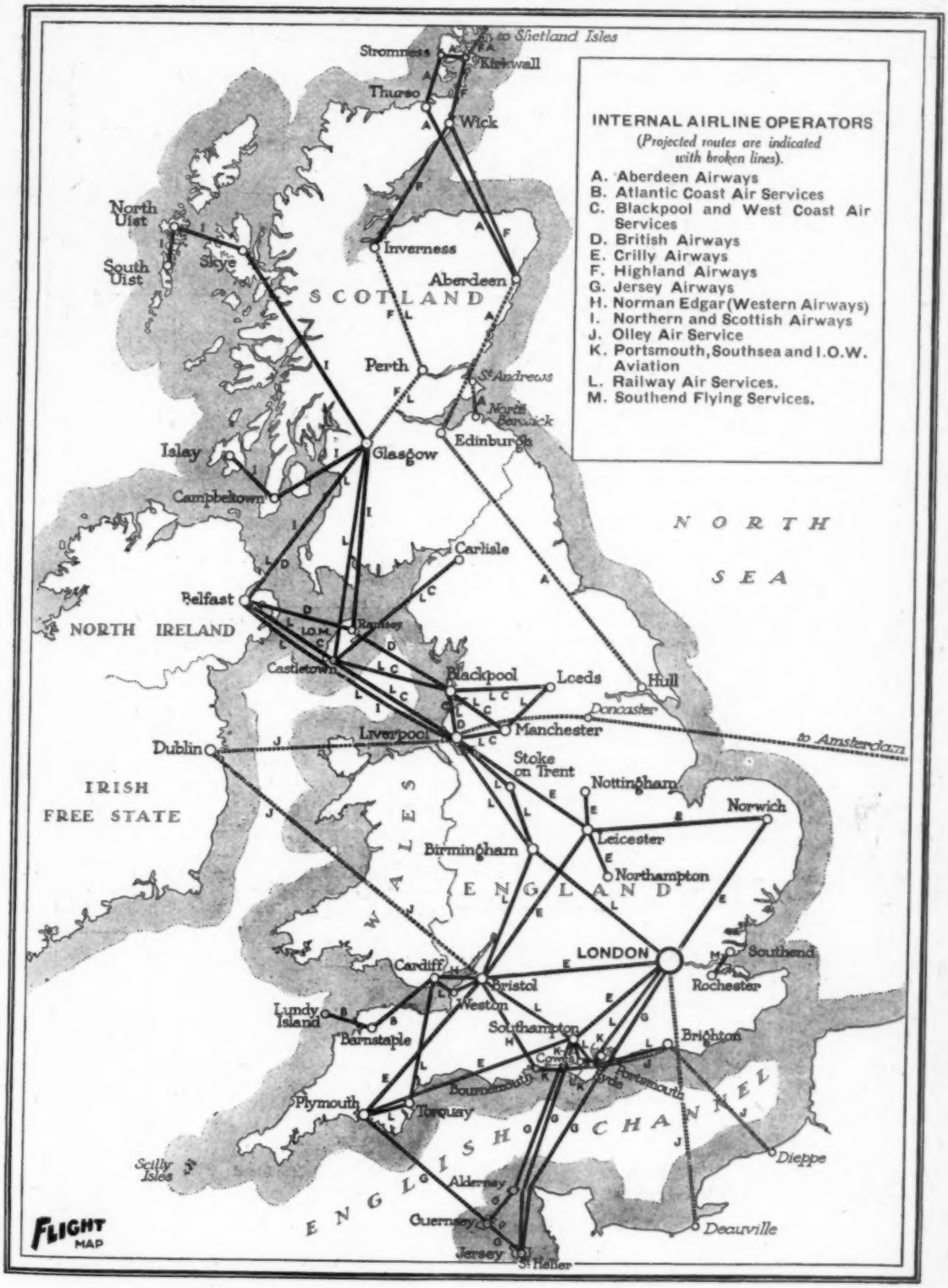
There have been several interesting developments as far as Continental services are concerned. Imperial Airways have waived their claim to a subsidy on routes north of a line between London and Berlin. British Airways were given both a mail contract and a subsidy for a service to Scandinavia—presumably on condition that they left Belgium, where they have already spent quite a lot of money. There was a certain amount of bad feeling about this Government assistance, as another company, British Continental Airways, had already signified its intention of running over the same route, and a third company, British Scandinavian Airways, is expecting to start a direct service to Copenhagen in the near future. British Airways, incidentally, have taken over Crilly's Lisbon project, which will come to life as soon as permission has been obtained to fly over, and land in, France. Early last year Imperial Airways opened a weekly service to Rome and Brindisi.

The Atlantic Project

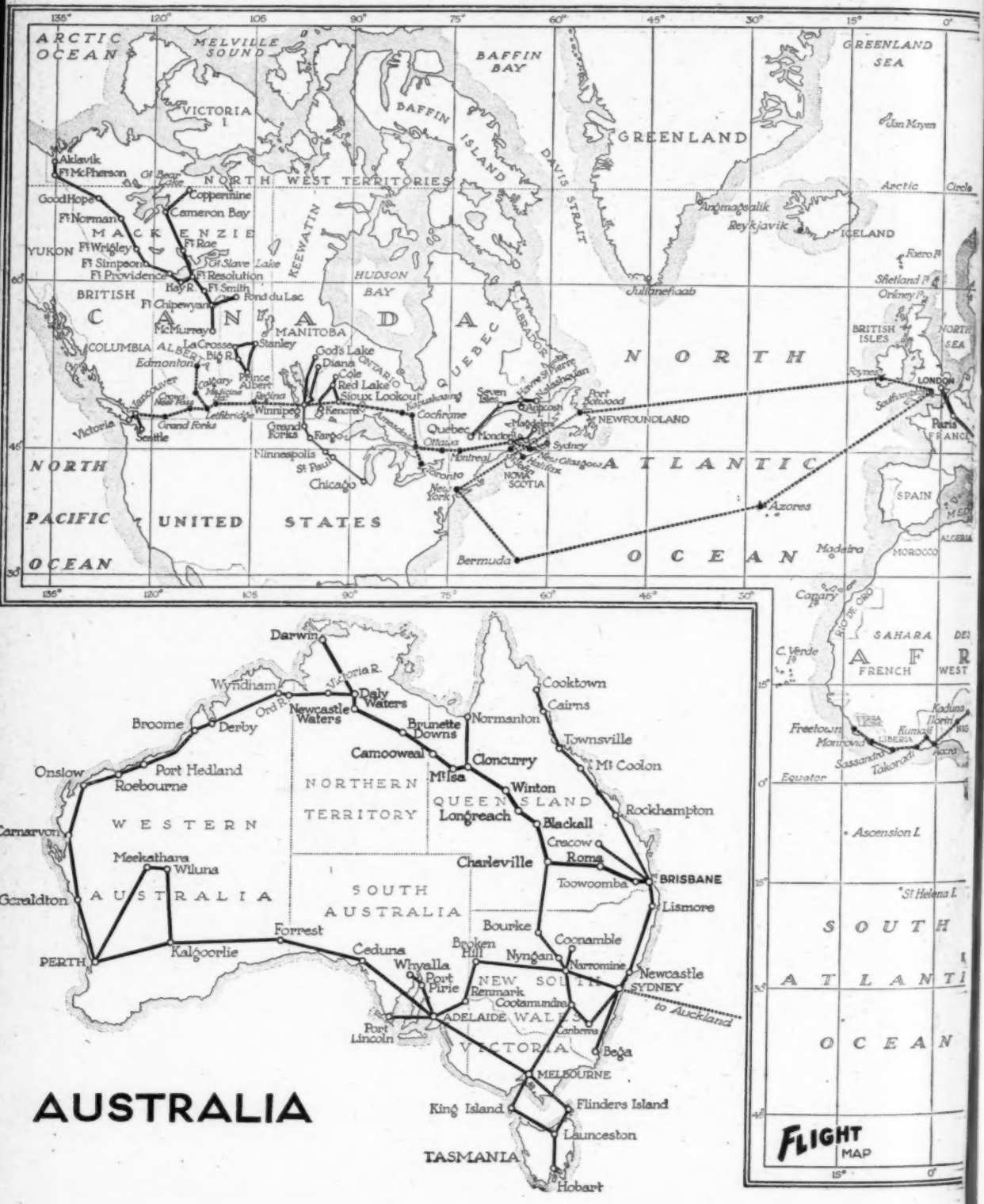
The year's high spot, of course, has been the publication of the new Empire and Transatlantic service plans. These have brought us back, for political and economic reasons, to the old idea of using flying boats almost exclusively on the long-distance routes, and twenty-nine big machines are now in course of construction—apart from the new fleet of landplanes which are also being made in readiness for the 1937 programme. To a large extent the new routes have been surveyed, though it is still doubtful whether the Australian section will be covered by boats, since the Australian Government have been in opposition to the idea. So far as Africa is concerned, South African Airways have already taken over the last section of the Cape service, and in due course the Empire boat terminus will be at Durban.

Three separate schemes are being worked out for the Transatlantic crossing, and this service will eventually be run in conjunction with Pan-American Airways. The Azores-Bermuda route does not involve such long hops, and this may be used for the east-to-west crossing and for all winter operations, while it remains to be seen how the Short-Mayo composite project works out in actual practice. In this case the crossing will be made direct.

THE AIR ROUTES of GREAT BRITAIN

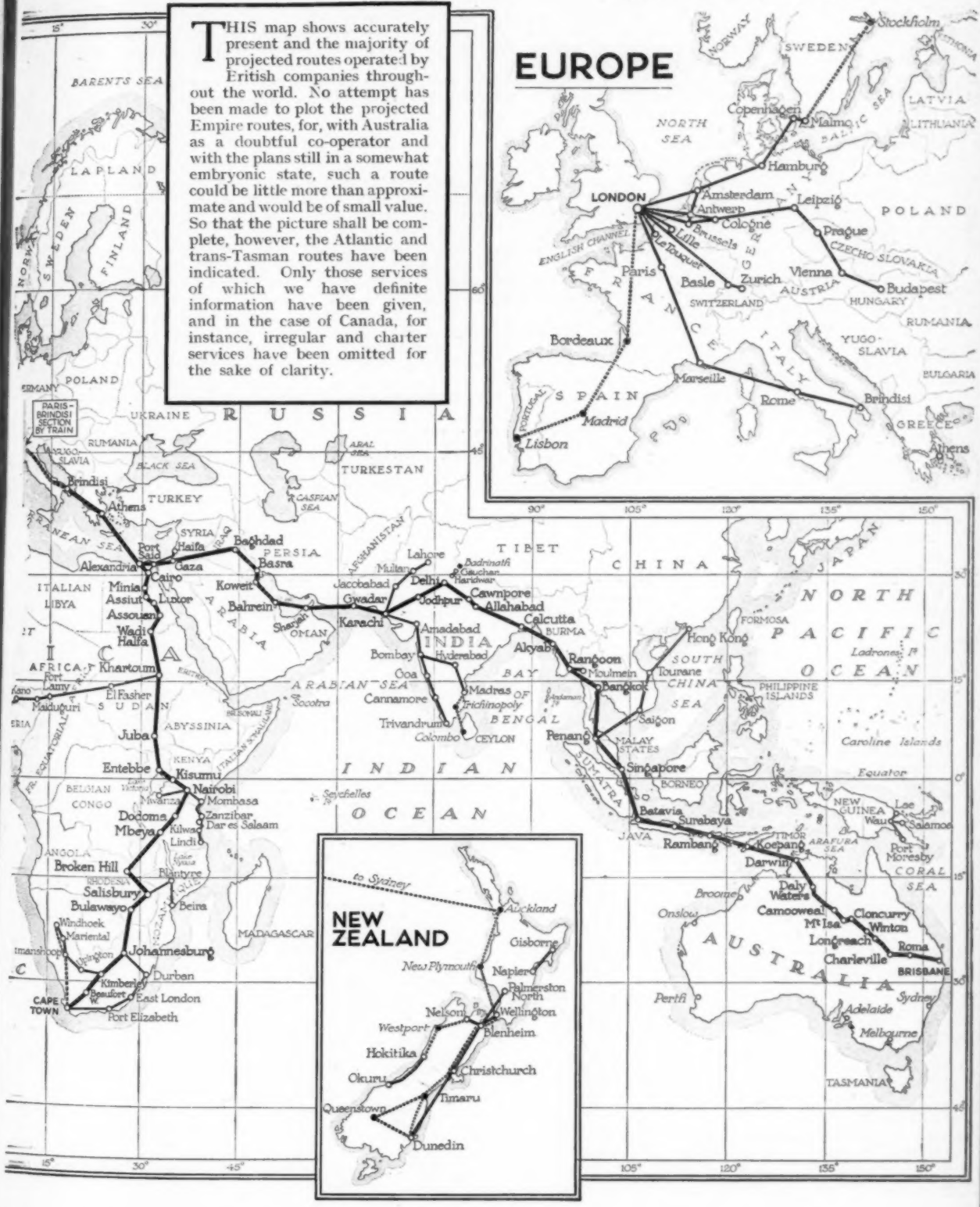


THE EMPIRE AIR ROUTES



Spanning the Globe : Present and Projected British Services Throughout the Empire and in Europe

THIS map shows accurately present and the majority of projected routes operated by British companies throughout the world. No attempt has been made to plot the projected Empire routes, for, with Australia as a doubtful co-operator and with the plans still in a somewhat embryonic state, such a route could be little more than approximate and would be of small value. So that the picture shall be complete, however, the Atlantic and trans-Tasman routes have been indicated. Only those services of which we have definite information have been given, and in the case of Canada, for instance, irregular and charter services have been omitted for the sake of clarity.



During the year two important extensions have been made to the Empire routes. One is from Penang to Hong Kong, and the other is from Khartoum across Africa to Kano. This latter service will eventually, in conjunction with Elders Colonial Airways, reach the Gold Coast. Extensive re-equipment and the inauguration of a service to Assuit have characterised Misr Airwork's year, while Wilson Airways—now a subsidiary of Imperials—and Rhodesian and Nyassaland Airways have consolidated their position. So far as the West Coast route is concerned plans of considerable importance are taking shape, but no announcement can be made for the present.

The aerodrome at Colombo must now be ready, but Tata's extension thence from Madras is still in abeyance, although this unsubsidised company extended its operations to Trivandrum several months ago. For some time it appeared to be possible that Indian National Airways might have to discontinue their service from Karachi to Lahore, but, fortunately, after a good deal of trouble; a subsidy has been promised.

It is not altogether strange, perhaps, that Australia, where the organised surface transport has not developed as thoroughly as elsewhere, should have more air-operating companies than any country in the world outside Europe and the United States. Several important extensions have been made to the trunk feeder lines, and some three or four new companies have emerged since the winter of 1934. One of these, though not yet in operation, has planned a new Transcontinental service, and another is covering the West Australian goldfields. New Zealand and Australia are still unconnected by air, despite the obvious need for the former to be more closely connected with the main Empire route.

Whereas two years ago there was not an airline in New Zealand, there are now four in actual operation, and another trunk service between Auckland and Dunedin should be starting in the very near future when the company has obtained the necessary flying equipment from this country.

Canadian Progress

Canada, though apparently ill-served, by comparison with its vast size, in the matter of regular air services, is, in fact, a country which makes more thorough and profitable use of the transport aeroplane than any other in the world. Until the Transcontinental route is opened, however, the air map of Canada will continue to appear bare and unplanned, but such a map would appear as a vastly complicated network if all the many charter routes were placed thereon. As it is, Canadian Airways are almost alone, among the eight or so operating companies, in running services to a regular schedule. In a somewhat similar position, though very different in the matter of distances, is New Guinea, where four companies carry between them the most enormous amount of freight in connection with the mining industry.

A NEW "ULTRA-LIGHT"

The Under-£200 Perman Parasol Monoplane : 10.32 h.p. Adapted Car Engine

SOME constructional details are now available regarding the Perman single-seater parasol monoplane, to which reference has been made in the recent issues of *Flight*. The machine has recently been undergoing flying trials, and some very satisfactory results are reported.

Built by a firm which has entered the aircraft industry by way of *Poux-du-Ciel*, the Perman Midget represents an effort to produce a single-seater of reasonably good performance at a price quite considerably below £200. Its designer, Mr. F. W. Broughton in confident that manufacture in quantities at low cost will present few difficulties.

Except that the power unit is a 10 h.p. Ford as adapted by Permans for *Pou-du-Ciel* work, the newcomer bears no affinity to the *Pou*, unless it be the fact that the wing is of rather low aspect ratio (5 : 1) and is of Clark Y section modified by having a slightly reflexed trailing edge. With this layout goes a short fuselage and lateral control in these circumstances calls for rather generous rudder area, but the machine has given no evidence of being over-ruddered.

The Wing

Carried 18 in. above the fuselage on two triangular tubular pylons, the parasol wing is of 25ft. span, and of 5ft. constant chord. There is no dihedral other than that given by a tapering of the lower edges of the two box spars towards the tips. There are 24 spruce and plywood ribs of fairly orthodox construction. The wing-tip formers embody hand-grips, there are ailerons of 6 sq. ft. area each, and the centre section contains a six-gallon fuel tank, in a position which obviously makes a gravity feed a very simple matter. There is also room for a smaller reserve tank to be fitted forward of the front spar.

The short fuselage is of very simple, straightforward construction, consisting of four spruce longerons spaced by four bulkheads aft of the cockpit and the engine bulkhead forward. The front ends of the longerons terminate in the hardwood mountings which carry the forward engine bearers and the radiator. At its rear end the engine is carried on the standard Ford bearers bolted to hardwood blocks on the top longerons. The fuselage framework is stiffened up by a "double-skin" covering of 3 mm. plywood on the inside and 1.5 mm. on the outside. The fuselage is turtle-decked with bent ply, which is very neatly faired into the fin and tail plane. On each side two metal struts, diverging from a single point at the base of the fuselage, brace the wing. A tubular split-axle undercarriage has oleo legs. The strut and undercarriage tubing, like the rest of the material with the exception of the spruce, is A.I.D.-released.

In common with the design as a whole, the control layout is the simplest possible, and practically the whole length of the elevator and rudder cables is carried outside the fuselage for accessibility in inspection. No rudder bar is fitted, its place being taken by two footplates hinged to the floor at their lower ends and pulling direct on the cables.

A small luggage locker is behind the cockpit, which latter is surprisingly roomy considering the generally small dimensions of the machine. Later modifications will provide rather more leg-room than is at present available. The view in all directions should be good, and better still when the vertical Scintilla magneto and downdraught carburetter are replaced (as they eventually will be) by components lying snugly alongside the engine and within a cowling.

On the instrument panel are an A.S.I., rev-counter, altimeter and cross level. The lubrication system of the engine is deemed by its makers to be infallible, so no oil gauge is fitted.

The Engine

The Perman-Ford engine develops 32 b.h.p., cruising at 3,100 r.p.m., and going up to 3,300 for take-off. It drives, direct, a Perman laminated mahogany airscrew of 4.1 ft. diameter and 2.14 ft. pitch.

The tare weight of the machine is 425 lb. and the gross weight about 575-600 lb. The wing loading works out at 5 lb./sq. ft.

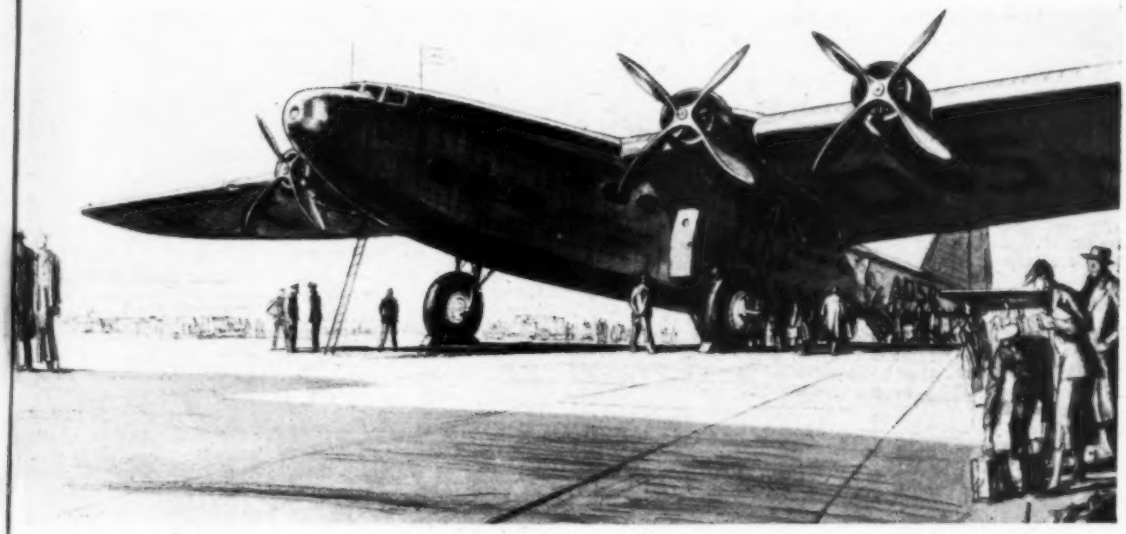
The makers are E. G. Perman and Co., Brownlow Mews, Guilford Street, Gray's Inn Road, London, W.C.1.

Flying trials are stated to have given the following very satisfactory figures: Cruising speed, 68 m.p.h.; top speed, 76 m.p.h.; landing speed, 35 m.p.h.; fuel consumption, 2 gall./hr.

A company is likely to be formed for mass production, and development of this interesting little machine will be watched with interest.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



PART OF THE PROGRAMME: This drawing, by Mr. Rowland Hilder, gives an excellent idea of the appearance of one of the twelve landplanes which are under construction by Sir W. G. Armstrong Whitworth Aircraft for Imperial Airways. Four Siddeley Tiger 800 h.p. engines will be fitted and the machines will carry twenty-seven passengers for day-time operations. The undercarriages will retract into the engine nacelles.

THE WEEK AT CROYDON

All the Fun of the Fair : Not So Dignified : Super Charter : The Bar Sinister : Sartorial Afterthought

THE arrival of Amy Mollison, after her truly magnificent flight, turned our usually peaceful but business-like airport into a mixture of Epsom Downs on Derby Day and Hampstead Heath on bank holiday. There was all the fun of the fair, including real live horses with policemen on them, Scotsmen in kilts with bagpipes, generals in Ambulance Corps uniform, and, of course, the usual crowd of chattering, gaping visitors aptly described by a passing ornithologist as "a murmuration of stares."*

There was a strong rumour that the Air Ministry had sold the place "lock, stock, and buffet," as they say, to a well-known newspaper—especially the buffet into which nobody but pushful pressmen had much chance of penetrating. One of the most truly dignified sights I have seen for a long time was the official rostrum, where a dignitary of the Air Ministry welcomed Mrs. Mollison, and which was plastered all over with newspaper posters like the front of a shop. Why not carry the idea a step farther and have the control tower decorated with yellow and green placards advertising some face cream which stops the hair from going grey and falling out? I have often wondered why there is not a row of flagstaffs somewhere adjacent to the terminal building, where the various house flags of the operating companies could be flown, adding a touch of gaiety to an otherwise somewhat gloomy prospect. It is done at most foreign airports, but I have always understood that ministerial dignity would suffer in some mysterious way if the companies were allowed to advertise in this way. Newspaper placards are a different thing, of course.

On Saturday morning Air France brought from Paris a Yugoslavian delegation concerned, it is said, with the purchase of aircraft in this country. The delegation was led by Maj.-Gen. Yankovitch, Assistant Commandant of the Yugoslavian Air Force.

Two Imperial Airways passengers from Africa flew to London expressly to join the *Queen Mary* on her maiden voyage, and an interesting Imperial charter was that to Paris by *Scylla*, pilot Capt. Horsey. The machine was chartered by the well-known parachute manufacturer, Mr. Leslie Irvin, and the occasion was his daughter's twenty-first birthday. Miss Irvin waved a giant "key of the door" with the figure "21" cunningly worked into the design. The party numbered some twenty-five, and there are far worse ways of spending money than by chartering a special luxury machine with every creature comfort aboard and flying to Paris in perfect weather with one of the senior captains of Imperial Airways at the controls. I did not seen any parachutes, though I suppose there is nothing to prevent passengers from bringing their own. Normally, excess baggage would be charged on them, and the company might insist on stowing them in a remote luggage hold out of harm's way.

Olley Air Service had two new D.H.86 machines at Croydon recently, and these were delivered to Liverpool by Capt. Olley and Mr. Higgins respectively, for the associate company's North of England routes. Later, one of them left for a tour of Europe with a party of Blackpool councillors.

* Archaic but correct expression for a flock of starlings; these sleek, inquisitive chattering birds which tend to collect in large crowds and make whoopee, with great slight provocation.

Commercial Aviation

There are rumours that the so-called pilots' room is to cease to exist as such, and that in future it will possibly form part of the airport hotel lounge, the folding doors being removed. Actually, it has for long been a sort of "bar sinister" to pilots and senior airport people, few of whom ever darken its doors. Mostly it seems to be frequented by odd apprentices and hangers-on about the place, and by members of motor cycling clubs hoping to be mistaken for air-line pilots in full flying kit. If the place had ever been the equivalent of a Captain's Room, natural selection, not to mention the survival (only) of the fittest, would have kept the present gang out of the place.

Something in the nature of a Captains' Room complete with port-holes through which port could be served is undeniably needed at the airport, but, even if one were provided, the odds are that the various air-line seniors would never be seen in it.

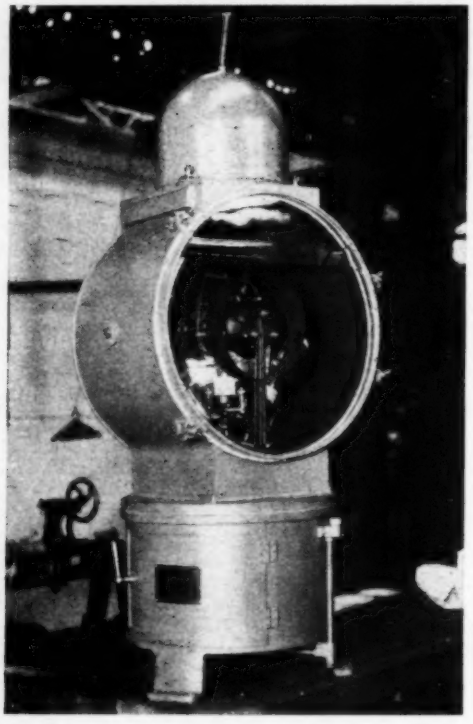
Capt. Morton, the senior technical officer of British Continental Airways, recently appeared in an outstanding example of the leather jerkin, which is said to be the workaday uniform of the brotherhood of bearded buccaneers. It appears that he had just collected, and flown to Croydon, a brand-new D.H.86A.—one of several machines that this firm has on order. A. VIATOR.

Perth Aerodrome

THE official opening of Perth municipal aerodrome is to take place on Friday, June 5. A civil flying training school in connection with the R.A.F. expansion scheme has been operated there for some months by Airwork, who also manage the aerodrome on behalf of the Perth Corporation. The ceremony will indicate the official opening to general traffic, and the opening will be carried out by Lord Swinton, the Secretary of State for Air.

Tropical Flying

WITH their customary energy the Air Ministry has now produced a booklet dealing with the medical aspect of tropical flying, and this book—*Medical Notes and First-Aid Treatment for Flights in the Tropics and Sub-Tropics*—can be obtained from H.M. Stationery Offices. In addition to a section dealing with general precautions this publication tells the unfortunate traveller how he may deal with injuries and diseases which he may suffer. The effect on the normal person is to cause him to eschew all thoughts of tropical travel.



FOR THE TRANS-INDIAN ROUTE : One of a number of light beacons which are being supplied to the Government of India by Chance Brothers, of Smethwick. Where no power supply is available these beacons have Chance automatic generating plants so designed that the beacon will run every night for a month without attention. If there is a failure in any part of the plant, a duplicate operating set takes over the work.

A Rapide for Wrightways

AIRWORK has resold two of the British Airways Rapides which were purchased in part exchange for larger machines. One has been sold to Rockhampton Aerial Services of Queensland, and the other to Wrightways of Croydon.

Portsmouth It Is

IT has been reported that both the Air Ministry and Imperial Airways have decided that Langstone Harbour offers better facilities than any other spot as an Empire flying boat base. The final approval of the Portsmouth scheme rests with Imperial Airways and is concerned, of course, with the question of financial assistance.

Radio for Kirkwall

THE appearance of a *Notice to Airmen* stating that there are radio masts near Kirkwall aerodrome (Orkney) suggests that Highland Airways have at last obtained some of the facilities for which they have been clamouring during the past two years. Shetland should have its radio station quite soon, and the company has expected an installation at Inverness, which, of course, is the seat of operations.

A.N.D. 13 and 14

VERY shortly, with the publication of A.N.D. 14, interested persons will be able to obtain a complete list of those aerodromes in the United Kingdom (excluding the Channel Islands) which are approved for Customs. However, since the Directions have been sent to the press, there have been three additions—Gatwick, Doncaster and Ronaldsway—and both Bournemouth (Christchurch) and Stapleford Abbots are no longer provided with facilities.

Meanwhile, in A.N.D. 13 there are various amendments of which pilots and others should take notice. G.E.'s licences, for instance, are valid for a period of a year, but may be renewed for periods up to a limit of two years; transport machines must carry a hand fire extinguisher and those capable of carrying ten or more passengers must have one in each compartment with a minimum of two; and a navigator's licence will only be issued to those who have flown at least 300 hours as *pilot or navigator*. In addition, certain changes have been made in the "B" licence medical requirements.

Essex Looks Ahead

SOME remarkably far-sighted plans for airport development in Essex are brought to light in a report, published last week at 10s. 6d. by the Essex County Council. The report is the work of Messrs. Norman and Dawbarn.

The scheme centres on the airport at Fairlop Plain, Ilford, which, as already reported, the City of London Corporation has decided to lay out at a cost of £600,000. This would form a "Class I" airport. Southend Airport would be extended in order to come within the same class, and, together with a Colchester site (at Berechurch), would act as a relief airport to Fairlop. Other subsidiary airports would be established at Chelmsford and Bishop's Stortford.

There would be airports at Gravesend Reach in the Thames and (as already authorised) at Harwich. An area in the Blackwater is proposed as a possible relief marine airport.

All sites within 20 miles of Charing Cross, which are suitable for use as "Class II" and "Class III" airports should, it is recommended, be reserved. Sites at Waltham Abbey, Broxbourne, Stapleford, and Erith are particularly mentioned.

Reservation of "Class II" sites to serve Brentwood and Billericay, Clacton and Braintree is also proposed. A suitable site to serve Tilbury, Orsett and Grays Thurrock may already be provisionally reserved.

By Air to West Africa

ON and after June 1 passengers will be carried on the Air France West African service. This is run weekly and a machine leaves Paris early on Sunday morning, the service calling at Toulouse, Alicante, Tangier, Casablanca, Agadir and Villa Cisneros on the way to Dakar. Dewoitine 333's—the development of the ill-fated *Emeraude*—will be used for the passenger service.

Another N.Z. Airport

ONE of the principal features of the air pageant held at New Plymouth, N.Z., in March, was a formation flight of twenty-seven machines. Air Force as well as club and commercial machines from Wellington and Auckland, took part.

The pageant, which was held in poor weather, marked the opening of the New Plymouth airport and the unveiling of a memorial tablet to the late Air-Commodore Sir Charles Kingsford Smith and Flt. Lt. C. T. P. Ulm. After the unveiling of the tablet by Lord Galway Air Force machines flew past, dipping in salute, and a firing party from the Taranaki Regiment fired three volleys.

Among the machines present was the *Tui* midget, piloted by Mr. Colin Lewis and illustrated in *Flight*, of January 16. A *Pou-du-Ciel* arrived from Waipukurau and was assembled on the ground.

In Southern Rhodesia

AVIATION is making remarkable strides in Southern Rhodesia, and in his report for 1935, the D.C.A. refers to new mail and passenger services connecting Nyasaland and Portuguese territory with the Colony where, by the year's end, there were sixty aerodromes and landing grounds.

The scheme, initiated under the aegis of the Beit Trustees, of constructing emergency landing grounds on the main routes is nearing completion and it is hoped to construct a further 175 landing grounds at the more important centres during the current year. A flying school is engaged in training a number of pilots for the Southern Rhodesian Defence Air Unit.

During the year fifty-seven pilots' and ground engineers' licences were granted or renewed and ten aircraft registration certificates and sixteen airworthiness certificates issued to operators.

"—With the Rank and Pay of a Sapper—"

SENIOR airline pilots of Imperial Airways were doubtless amused to read a recent remark that it was a matter for surprise that they were better paid than transatlantic boat skippers who spent the whole of their days and nights shouldering far greater responsibilities. Surprise in matters of this sort is the natural outcome of supposing that it is as easy to fly a big machine through all weathers as to theorise about the business (remarks "A. Viator").

It is, as a matter of fact, open to doubt if Imperial skippers are paid more than those of their transatlantic seafaring brethren who are up to the same standard in experience, and, above all, in ability to make the correct decision in the flash of a split second. Airline flying is the only three-dimensional form of transport, and, after all, some extra pay is perhaps due to experts in this comparatively new but important branch. The ocean skipper, incidentally, is paid for all his sleeping hours and for his hours ashore, whereas, but for a small retaining fee, Imperial skippers work for most of their money and only get it when they are flying.

Perhaps the most important fact of all is the most frequently forgotten. There is a dividing line in Imperial Airways, as there is also in Air France and K.L.M., between the handful of men who have been with the company, or in the commercial air business, since the days when it was a risky job and those other pilots, excellent though they undoubtedly are, who came later into the field. In the pioneer days the pilots were highly paid, and it was agreed on all hands that it should be so. There is such a thing as gratitude for the magnificent work these men have done, and the directors of the national British company have shown theirs by deciding that the handful of original pilots shall continue to be paid at the same rates as formerly.

But for these pioneers it has become almost universally the fact that the air pilot is paid considerably less to-day than he was ten years ago, and certainly the rank and file are not more highly paid than transatlantic sea captains, though their job is by no means the same sort of old-established, rule-of-thumb affair.

Improvements in the East

THE work of providing improved ground facilities—including night-flying equipment—is now well in hand at aerodromes in India and Burma. The improvements which are being provided include larger sheds and meteorological buildings, macadam runways, new D/F stations and amplified aerodrome lighting.

At Karachi many improvements are being carried out, while at Delhi improved sheds and buildings have already been provided. A big new hangar is in construction at Allahabad and there are to be improved meteorological facilities. Rangoon is to be developed, and at Akyab there are to be new buildings and improved runways. At Lahore work is to begin on the construction of a big hangar, offices, and other accommodation. Special drainage work is in progress at Bombay, and new runways are being constructed, while at Madras plans have been prepared for improved accommodation, and a suitable site is now being selected.

All the Operators

BELOW is a list of the airline companies whose lines appear in the maps on pages 533 to 535, including the charter operators in this country. The centres of operation are given in each case.

Great Britain

Aberdeen Airways, Aberdeen; Atlantic Coast Air Services, Barnstaple; Blackpool and West Coast Air Services, Liverpool; British Airways, London; Crilly Airways, London; Highland Airways, Inverness; Jersey Airways, London; Norman Edgar (Western Airways), Bristol; Northern and Scottish Airways, Glasgow; Olley Air Service, Croydon; Portsmouth, Southsea and I.O.W. Aviation, Portsmouth; Railway Air Services, London; Southend Flying Services, Southend.

Charter Operators in Great Britain

Air Commerce, Heston; Air Dispatch, Croydon; Air Taxis, Croydon; Air Travel, Penshurst; Birkett Air Service, Heston; British-American Air Services, Heston; Olley Air Service, Croydon; Personal Airways, Croydon; Philip Bailey, Croydon; Sandown and Shanklin Flying Services, Sandown; Surrey Flying Services; West of Scotland Air Services, Renfrew; Wrightways, Croydon; Yorkshire Aviation Services, Northallerton; Yorkshire Airways, Leeds. (In addition, all clubs will do charter work and there is usually a suitable machine and pilot available at any aerodrome in the country. The companies given make a speciality of the work.)

Europe

Imperial Airways, London; Air Dispatch, Croydon; British Airways, Gatwick; British Continental Airways, Croydon; British Scandinavian Airways, London; Olley Air Service, Croydon.

Africa

Imperial Airways, Cairo; Misr Airwork, Heliopolis; Rhodesian and Nyasaland Airways, Salisbury; South African Airways, Cape Town; Wilson Airways, Nairobi.

Australia

Qantas Empire Airways, Brisbane; Adastra Airways, Mascot; Adelaide Airways, Adelaide; Aircrafts Pty., Brisbane; Airlines (W.A.), Perth; Airlines of Australia, Sydney; Butler Air Transport, Cootamundra; Commercial Aviation Co., Parafield; Holyman's Airways, Launceston; T. H. McDonald, Cairns; MacRobertson-Miller Aviation, Perth; New England Airways, Brisbane; Rockhampton Aerial Services, Rockhampton; W.A.S.P. Airlines, Mascot; West Australian Airways, Perth.

New Zealand

Air Travel (N.Z.), Hokitika; Cook Strait Airways, Nelson; East Coast Airways, Gisborne; Great Pacific Airways, Wellington; Union Airways, Palmerston North; New Zealand Airways, Timaru.

New Guinea

Carpenter's Aerial Service; Guinea Airways; Holden's Air Transport; Pacific Aerial Transport (all centred at Lae).

India

Imperial Airways, Karachi; Himalaya Air Transport and Survey, Hardwar; Indian National Airways, Delhi; Indian Trans-Continental Airways, Karachi; Irrawaddy Flotilla and Airways, Rangoon; Tata Sons, Bombay.

Canada

Canadian Airways, Winnipeg; Brook's Airways, Prince Albert; Canadian Colonial Airways, Montreal; General Airways, Siscoe; National Air Transport, Leamington; Northern Airways, Atlin; Quebec Airways, Quebec; Wells Air Transport, Vancouver; Wings, Winnipeg.

MRS. MOLLISON'S FINE "DOUBLE"

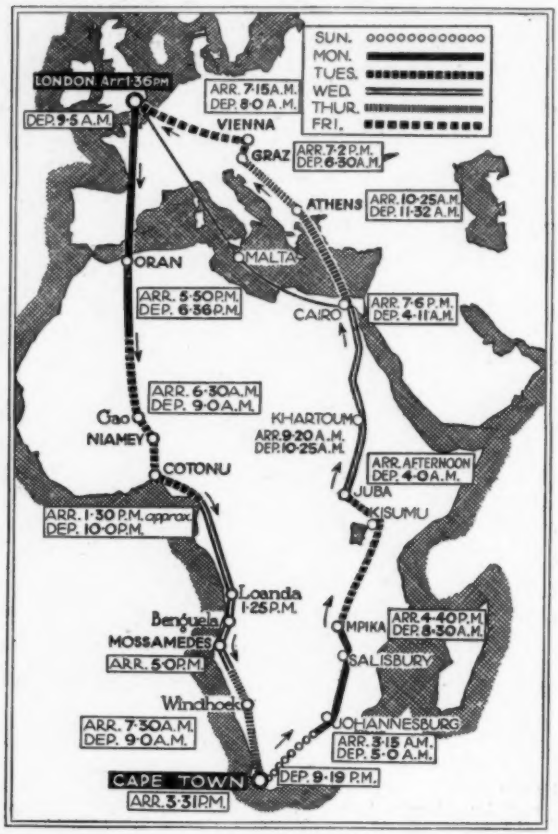
Her Gipsy Six Gull, Returning from the Cape, Beats Existing Time by 1 Day, 14 Hours, 40 Minutes : 14,200 Miles in 11 Days

EVEN those who question the utility of long-distance "record" flying have had to admit that Mrs. Amy Mollison has put up, in the current vernacular, a jolly good show.

Allowing the possession of a reliable engine and aircraft; allowing that the route was not a pioneer one; allowing that there were no long sea crossings and that on many parts of the route a flying search party might be able to spot a disabled machine and effect a rescue; making due allowance for all these things, one still has to acknowledge that to fly 6,700 miles solo in 78 hours, rest for three days, and then return by a different route of 7,500 miles in 112 hours indicates almost superhuman qualities of navigational skill and physical endurance. And this is leaving out of account the added fact that the pilot in question is a member of the so-called weaker sex.

Mrs. Mollison, who built up an enviable reputation as a long-distance pilot after her solo England-Australia flight in 1930, at first alone and then partnered by her husband, has done little flying of this kind during the last year or two, a fact which makes this "come-back" all the more triumphal. Bearing these things in mind, it is perhaps natural that the personal triumph should rather tend to overshadow the mechanical one, but the makers of the Percival Gull, its Gipsy Six, and the miscellaneous equipment, have been among the first to give full credit to the pilot.

Amy-ability : A happy picture of Mrs. Mollison at Croydon with her husband on her return.



Mrs. Mollison's out-and-home progress day by day. The thin line shows Flt. Lt. Rose's return route *via* Malta.

Some details of Mrs. Mollison's outward flight from Gravesend to Cape Town were given in last week's issue. She followed the shorter and more formidable West Coast route, beating Flt. Lt. Rose's East Coast time by 11 hr. 9 min. She returned over the latter route, but made a diversion *via* Athens instead of taking Rose's Mediterranean crossing *via* Malta. In spite of an unexpected twelve-hour stop at Graz, Austria, caused by unfavourable weather, she reduced his time by no less than 1 day 14 hr. 40 min.

According to Plan

Her day-to-day progress is clearly shown in the accompanying map. It only remains to be said that the homeward flight was carried out almost exactly according to plan, her machine's speed and the excellence of her airmanship enabling her to fly regular daily stages with reasonably long stops for sleep.

Extra tankage in the Gull—an 85-gallon tank in the cabin and 20- and 10-gallon tanks in each wing (145 in all) gave a range of 2,400 miles.

Mrs. Mollison was welcomed at Croydon on Friday by Mr. J. G. Gibson, Deputy Director of Civil Aviation; Mr. W. G. Klerck, of the South African High Commissioner's Office; Mr. James Mollison and members of the family, and some thousands of highly enthusiastic members of the general public. She landed after her final stage from Graz looking as fresh as the proverbial daisy.

The following message from Lord Swinton, Secretary of State for Air, was handed to Mrs. Mollison on her arrival:

"Dear Mrs. Mollison,—I telegraphed to congratulate you at the Cape on your great flight, and I want to be among the first to congratulate you on your return. Your double flight is a splendid achievement.—Your sincerely,

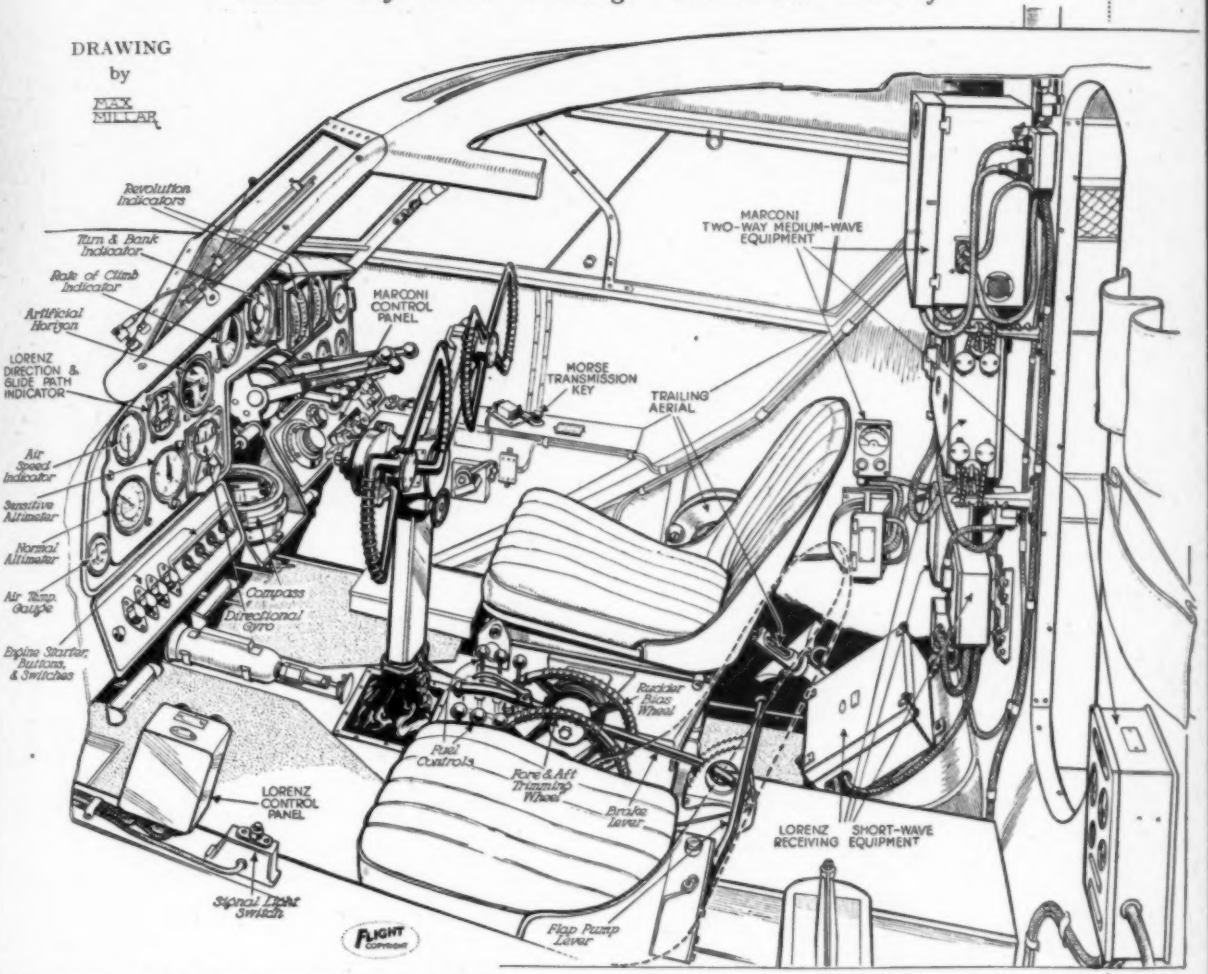
(Signed) SWINTON."

The equipment of the Gipsy Six Gull included the following:

B.T.H. magneto, Claudel-Hobson carburetter, K.L.G. plugs (original set unchanged), Tecalemit lubrication, Terry springs, Weyburn camshaft, Smith's engine instruments, Fairey metal airscrew, Shell fuel, Patent Castrol XXL oil, Smith's P.4 compass, Kollsman altimeter, Marconi short-wave wireless equipment, Rotax generator, starter and battery, Demec navigation lights, Vickers landing lights and three-way petrol taps, Percival petrol tanks and undercarriage, Bendix brakes, Dunlop front tyres and wheels, Palmer tail wheel and tyre, Titanine dope, Rumbold upholstery and Moseley Float-on-Air Cushions, Splintex windscreen and windows, detail fittings by Brown Bros. Ltd., fabric by Bessbrook Spinning Co., Bamberger spruce, and Flexo plywood.

INSTRUMENTAL

—— *in Ensuring Air Transport Efficiency : A Typical Control Layout in a Large Commercial Aircraft*



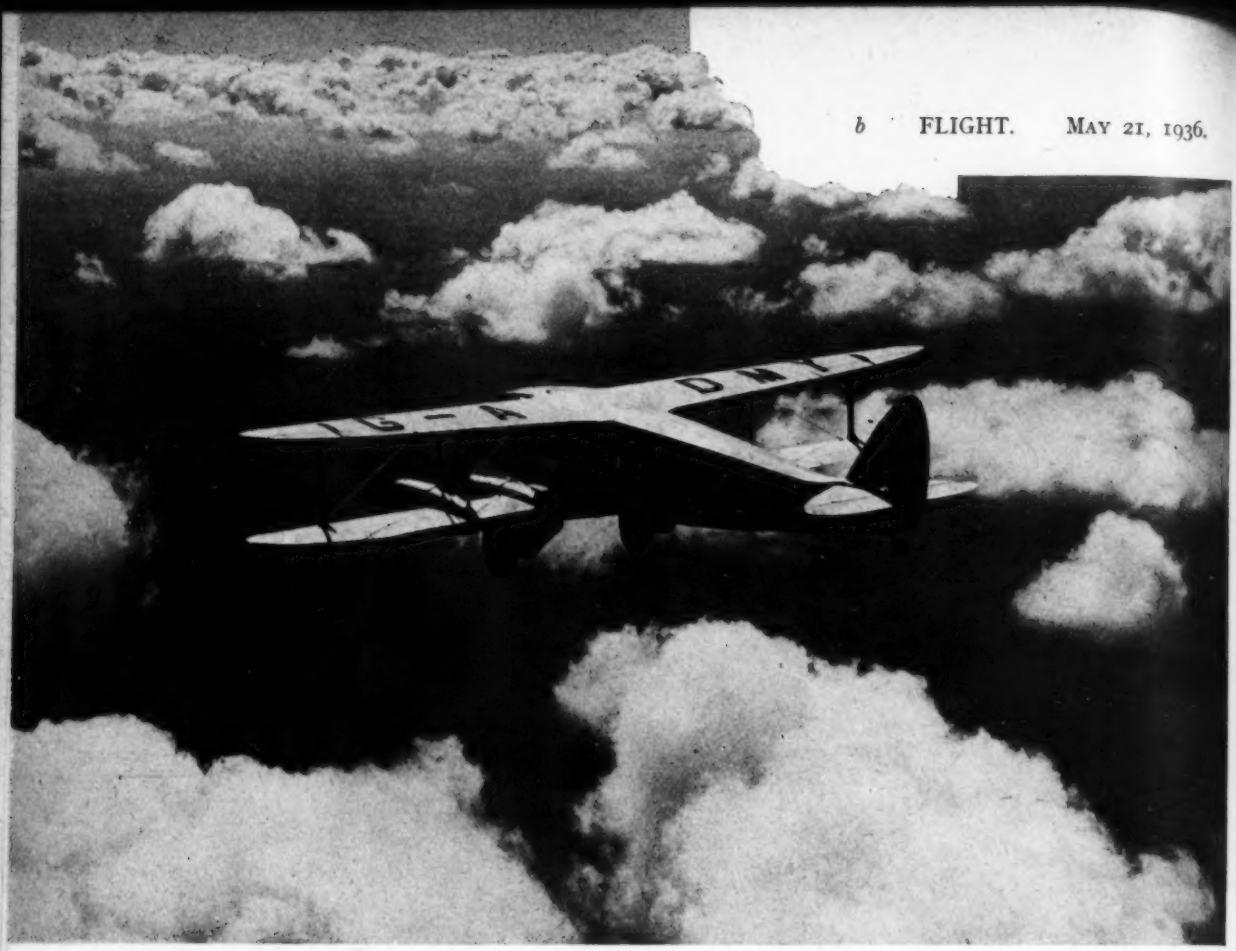
IN an article which begins overleaf, "ground control" of aircraft is explained and reviewed. A study of this drawing will form a useful introduction to that article, for it illustrates what might be termed "the pilot's end" of the subject.

As an example of really modern equipment we have taken the very first of the De Havilland 86 A's to be delivered to British Continental Airways for their European services. These machines, by virtue of the uses to which they are to be put, are fitted with equipment which would not at present be of very great value for internal operation, and the instruments are calibrated in the metric system. Nevertheless, the general layout can be taken as that to which the majority of machines used for serious air-line operation will conform in the very near future.

The most interesting feature is the actual and virtual duplication to be found throughout the instrumental equipment. In addition to the standard altimeter, for instance, there is a rate-of-climb indicator and a sensitive altimeter, which, in turn, duplicates to some extent the indications of the short-wave glide-path indicator. Again, in addition to turn-and-bank and pitch indicators, there is an artificial horizon and a directional gyro—which, with the turn indicator, will assist the pilot in holding his approach course with the short-wave directional needle.

Although normal course-flying will be carried out on the directional gyro, the compass forms the base of all navigation. All communication to and from the ground control, up to and after the moment of making the approach, is carried out, of course, by means of the essential two-way radio equipment, in Morse, and with the help of a special international airway code which has been developed. With the ever-present possibility of ice formation, the appearance of an outside-air temperature gauge is interesting.

This particular series of machines have, in addition to the normal trailing aerials and the miniature ultra-short-wave aerials, exceptionally long fixed aerials, so that reception and transmission shall be really satisfactory when the main aerial is wound in.



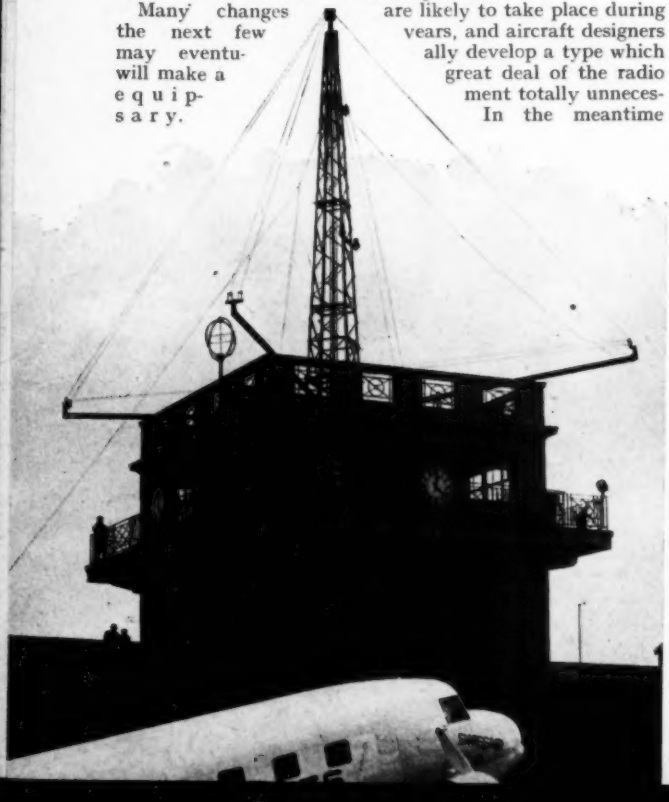
Flight photograph.

AIR TRAFFIC CONTROL

Modern Equipment for Modern Conditions : Some Present-day Problems : British, Continental and American Systems Explained

WHEREAS, a few years ago, the operators and knowledgeable air travellers looked to the aircraft and engine designers to provide them with regularity, now they look to the radio experts and pilots. Which is not to say that the standard of weather has deteriorated or that the present-day machine is perfect. Because of the aeroplane's essential defects, error-proof signalling and guiding systems have been made more and more necessary for all-weather operations, and these systems must naturally depend on the success of various forms of radio development.

Many changes are likely to take place during the next few years, and aircraft designers may eventually develop a type which will make a great deal of the radio equipment totally unnecessary. In the meantime we can only plan for present conditions, and, as far as Europe is concerned, the traffic control and guiding systems have crystallised into a clearly defined shape.

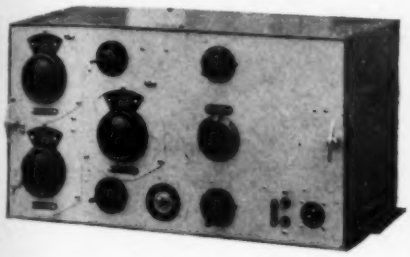


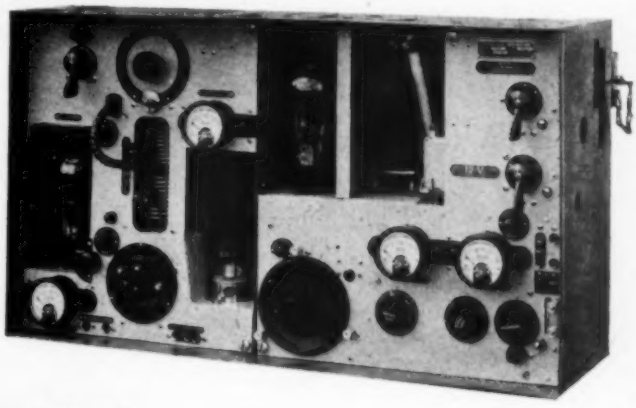
This "shape" involves the ground control officers, ing systems have crystallised into a clearly defined shape.

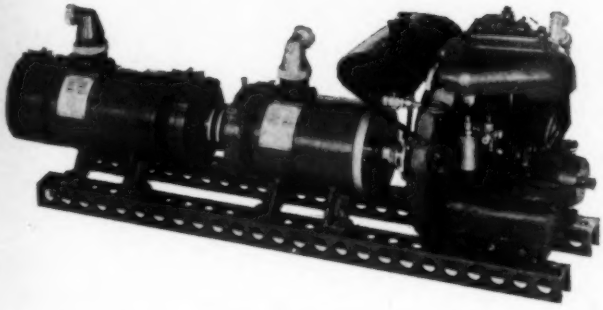
This "shape" involved the ground control officers, rightly or wrongly, in a good deal of responsibility. A man, after all, who is working and thinking in the comparative calm of the control office should be surer and quicker in his decisions than any pilot. It involves the use of special controlled areas and, more recently, of a separate beam transmitting beacon to enable the pilot to find the airport after he has been directed to it and given permission to come in. Eventually, so crowded is the air becoming in the region of terminal airports, it may be necessary for pilots on certain routes to fly only at specified heights until the actual moment of the approach.

Although it is customary to think of the ultra-short-wave beacon, with its accessories, as a device designed expressly to allow flying in conditions of visibility which might otherwise prohibit it, the real value of this development lies at present in its capacity to increase the number of landings that are possible at a busy airport in bad

FOR the EMPIRE BOATS







Some features of the special equipment developed at Marconi's Hackbridge works, for the Empire flying boats. Above are (left and right) the receiver and transmitter for medium and short waves; the latter are to be used for tropical communications and direction-finding. On the left is the auxiliary power unit for use while the machine is on the water, comprising a two-stroke engine, a generator (also used as a starting motor) and a double-output (L.T. and H.T.) generator.

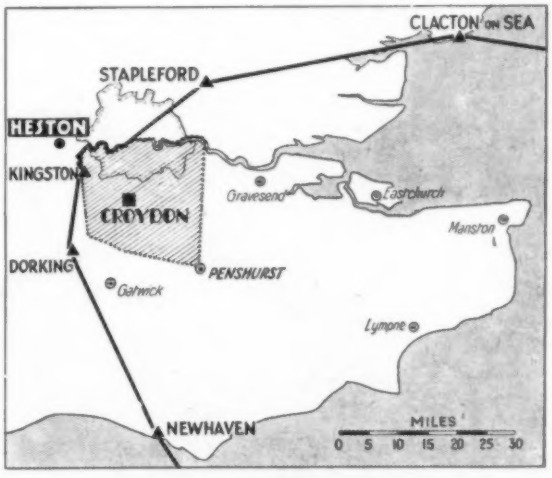
weather. On certain days it is not unusual for machines to fly about for upwards of half an hour while other pilots are endeavouring to locate the airport with the help of rockets and other unsuitably maritime devices, and while still later arrivals are forced by shortage of fuel to make for other aerodromes.

As its name implies, a controlled area is one into which no machine may enter without first obtaining permission from the central control. This permission may be obtained by radio, or, in the case of unequipped machines, by telephone after landing at some aerodrome outside the area when the weather is not quite impossible. By this means the officer at the terminal airport is able to retain complete control over the movements of all machines within a certain radius of this airport. Outside this area he can still request pilots to change altitude if there is any possible danger of collision, but it is with the controlled area that he is specially interested when visibility is reduced to the international Q.B.I. standards of 1,000 yards horizontally and 1,000 feet vertically.

Remote Transmitters

At Croydon there are, in fact, three separate Marconi radio sets, one of which is reserved exclusively for dealing with each machine as it is given permission to approach the airport, and is used only in Q.B.I. conditions. This set has its own D/F aerial for the final guidance of pilots, though all three sets have their transmitters at Mitcham, where adequate masts can be used without danger to approaching machines. Needless to say, the necessary meteorological and other communications are carried out on different wavelengths.

The officer on duty has before him a very large map into which pins with identification flags are placed to indicate the approximate position of each machine in regular operation within the control area. As information is received, or at regular intervals by dead reckoning, these pins are moved accordingly. A second large map is used to plot bearings and "fixes" with the help of lengths of thread which emerge from the positions occupied by the Pulham, Lympne and Croydon D/F stations. The two outlying stations, on request, obtain a bearing on a transmitting machine, and their results are re-transmitted to Croydon, where the machine's position is plotted. The whole business does not usually take more than a couple of minutes. In the ordinary way the pilot only requires direct bearings from Croydon, and in thick weather these



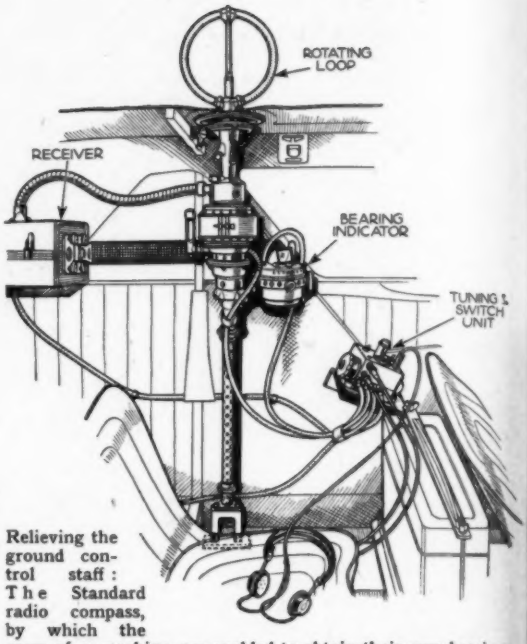
The area which is looked after by the Croydon control officers. The shaded area surrounding the airport is the "controlled zone," which no machine may enter during conditions of poor visibility unless the pilot previously obtains permission from Croydon.

can be obtained at regular intervals in order to bring the machine up to the airport.

So far as ground control is concerned, permission to taxi out is first given, and, when the machine has turned into wind, final permission to depart is given by means of an Aldis signalling lamp from the tower.

It is obvious, however, that there is a limit to the number of machines that can be handled by this method when the weather is bad, and certain changes—such as one involving "layer flying"—may be necessary within a very short time. Meanwhile, both Heston and Portsmouth have their own areas to deal with, and there is no doubt that the controlled zone system will also be used at all the more important terminal airports when the air traffic in this country justifies such a move. Apart from the radio stations mentioned, there are some five others already in action in this country, and several more will be in use before the end of the present year.

The ground radio stations are considerably relieved, of course, when machines carry their own direction-finding equipment, and there is a tendency now among the Continental operators to use machines which are, so to speak, self-supporting in matters of radio navigation except during the first and last stages of a journey. In this case it is usual to take bearings on broadcasting stations, which have the double advantage of being almost continuously in action and being extremely numerous in Europe. On our Empire routes this system of "self-determination" has been in use for a number of years, and the Empire flying boats will have short-wave and "homing" equipment in addition to the normal medium-wave outfit.



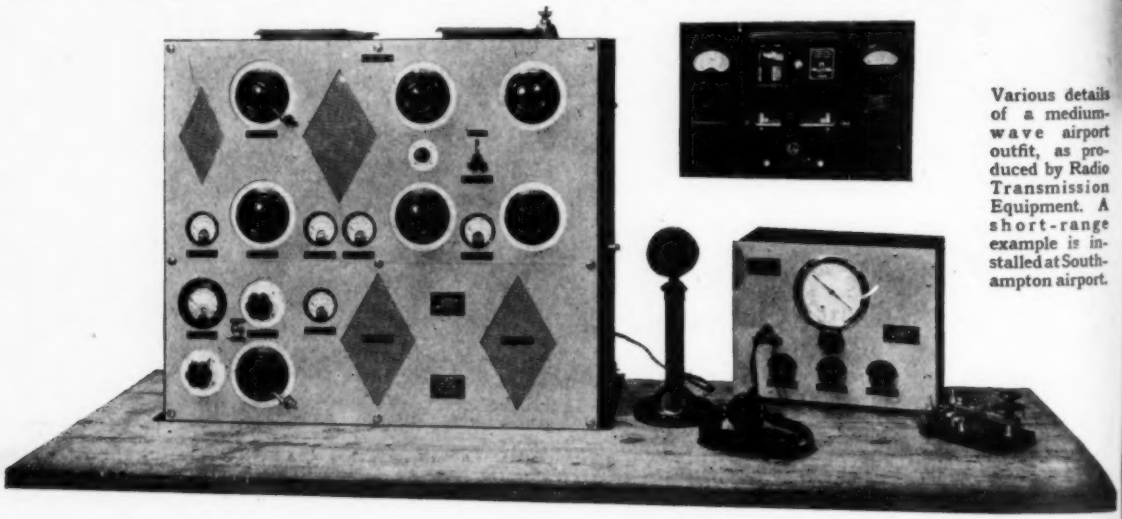
Relieving the ground control staff: The Standard radio compass, by which the crew of a machine are enabled to obtain their own bearings and "fixes" independently of the ground D/F stations.

The Radio Beacon

In Europe the radio beacon has never formed an important part of the airway-guiding system, and is only now being put to serious use for assisting the final approach in conditions of poor visibility. From time to time shipping beacons are used by machines with their own D/F equipment, but the disadvantage of an automatic beacon system to cover the whole air-line system is, of course, that the risk of collision cannot always be guarded against. Various schemes for a series of equi-signal beacons to serve the internal routes have been drawn up, but neither operators nor pilots, so far, have been particularly impressed with the idea.

Such a system of beacons has, however, formed the basis of American air traffic control, and it is only within comparatively recent times that the necessity for two-way communication has been apparent. Originally it was imagined that only a receiving set would be necessary—with consequent economy in weight and cost. Now, in addition to the beacon signal receiver, separate two-way sets are being carried, these working on a different wavelength, and the result is that the American air-line machine must carry more equipment than does its European counterpart.

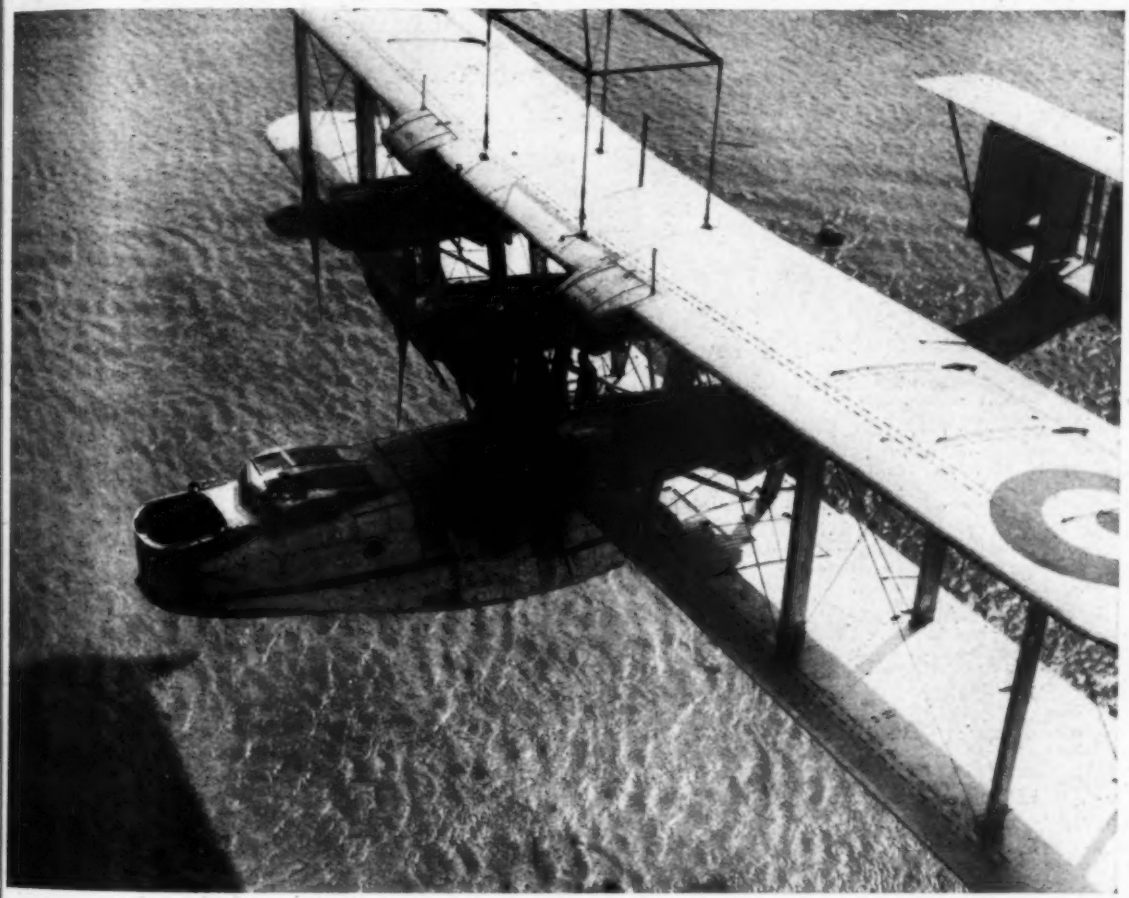
With the passing of the Air Commerce Act in 1926, the U.S. Government was authorised to provide these beacons where necessary, though no mention was made of two-way communication. The result was that the operators themselves demanded this addition, and presently the "Aeronautical Radio Incorporated" was formed for the purpose of owning and organising the necessary communications, both between ground and air and between airports. Air-line machines are, in fact, required by law to carry receivers for both beacon and meteorological broadcast reception, quite apart from any two-way equipment which the operators themselves may deem necessary. The A.R.I. gives identical service to all operating companies, and this service is paid for by the operators.



Various details of a medium-wave airport outfit, as produced by Radio Transmission Equipment. A short-range example is installed at Southampton airport.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS AIR MINISTRY ANNOUNCEMENTS



A PULLER OF PERTH : The fifty-ton crane on the jetty at Felixstowe, bringing ashore a Blackburn Perth flying boat (three 825 h.p. Rolls-Royce Buzzards). This picture was secured from the jib of the crane. (*Flight* photograph.)

NEW AUXILIARY SQUADRONS

Recruiting will begin immediately after Whitsun for the three new squadrons of the Auxiliary Air Force formed under the expansion scheme. These are No. 609 (West Riding) Squadron, Yeadon aerodrome, with headquarters at Leeds; No. 610 (County of Cheshire) Squadron, Hooton Park; and No. 611 (West Lancashire) Squadron, Speke, with headquarters at Liverpool. All are bomber squadrons, and come within the command of No. 1 Air Defence Group, London.

On account of its reorganisation as an Auxiliary Air Force unit, No. 500 (County of Kent) Bomber Squadron, Manston, is not proceeding to Hucknall this month for its annual camp. The date and place of the camp will be notified later.

R.A.F. SUB-DEPOT, ORPINGTON

The R.A.F. Sub-Depôt, Orpington, will close on May 31, 1936.

GORDON SHEPHARD MEMORIAL PRIZE

The following will be the subject of the Gordon Shephard Memorial Prize Essay for 1936-1937 :—

"The increasing range of aircraft may materially affect the Royal Navy's ability to carry out its primary role, that of control of sea communications.

"Discuss this and illustrate the methods by which types of shore-based aircraft can be employed to assist the Navy in maintaining our sea communications while interrupting those of an enemy.

"A reasonable latitude may be allowed in the performance of aircraft, but types should be restricted to those at present in use in the Royal Air Force, *i.e.*, flying boats, general reconnaissance, torpedo bomber and bomber aircraft."

Essays, in triplicate, should be forwarded to the Secretary, Air Ministry, in envelopes marked "Gordon Shephard Memorial Essay, 1936-1937," so as to arrive on or before February 1, 1937.

ROYAL AIR FORCE BENEVOLENT FUND

His Majesty The King has been graciously pleased to give an annual subscription and to confer upon the Royal Air Force Benevolent Fund the honour of his patronage.

His Royal Highness the Duke of York is the President, and the Viscount Wakefield of Hythe is the Chairman of the Fund which exists to relieve distress among all ranks, past and present, of the Royal Air Force and their dependants.

The second Council meeting of 1936 was held on Wednesday, May 13. Viscount Wakefield of Hythe was in the chair. The Hon. Treasurer reported that grants expenditure for the Council year up to date had reached £5,700, representing an increase of more than £500 over the total expended during the same period last year. This increase resulted from a very considerable rise in expenditure upon war-time cases which had not been off-set by the falling demand of post-war cases. Donations during the same period had fallen. This was partly due to the decision to cancel the Royal Air Force Display in the Middle East Command. The withdrawal of support at short notice from a source which has made a very valuable contribution to the Fund over a period of years, emphasises the insecurity of the Fund as regards its dependence upon Royal Air Force Displays. A letter was sent on behalf of the Council to the Chairman of the Comrades of the Royal Air Forces Association conveying thanks for their very helpful spirit of co-operation in proposing to hold special functions once or twice a year at the various Comrades of the Royal Air Forces Association Centres, in aid of the Royal Air Force Benevolent Fund.

ROYAL AIR FORCE GAZETTE

London Gazette, May 12, 1936

General Duties Branch

Flt. Lt. W. J. Hickey is granted a permanent commission in this rank (May 13).

The following Flying Officers are promoted to the rank of Flight Lieutenant with effect from the dates stated:—C. P. Villiers, E. Foster, J. C. Macdonald, L. G. Belchem, R. F. Smith, F. A. A. H. Strath, E. J. N. Heaven (R.A.F.O.), W. E. Oulton (April 1); J. Goodhart (April 11); C. E. S. Lockett, P. R. J. Leborgner, A. Moncrieff, J. J. A. Sutton, A. D. Isemonger (May 9).

The following Pilot Officers are promoted to the rank of Flying Officer with enect from the dates stated:—J. W. McGuire (March 14); J. Shepherd-Smith (March 22); D. F. Macdonald (March 29); S. S. Bertram, E. U. G. Solbe (April 1); H. de C. A. Woodhouse (April 2).

Flt. Lt. L. R. W. Tillard is placed on the retired list on account of ill-health (May 7); F/O. E. B. Waddy is transferred to the Reserve Class A (May 13).

Chaplains Branch

The Rev. A. R. A. Watson, M.A., relinquishes his short service commission on completion of service (May 1).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers
General Duties Branch

F/O. E. C. Durbin is granted the honorary rank of Flight Lieutenant while serving with the Royal Air Force as a civilian assistant (April 1); Flt. Lt. (Hon. Sqn. Ldr.) G. C. Rhodes (Squadron Leader, R.A.F., retired) relinquishes his Reserve commission on completion of service (April 30).

SPECIAL RESERVE

General Duties Branch

P/O. A. P. Anderson is promoted to the rank of Flying Officer (March 29).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore.—R. H. Peck, O.B.E., to Headquarters, R.A.F., India, Simla; for duty as Senior Air Staff Officer vice Air Comdre. B. E. Sutton, D.S.O., O.B.E., M.C., 13.3.36.

Wing Commanders.—A. H. Orlebar, A.F.C., to D.S.D., Dept. of C.A.S., Air Ministry, vice Wing Cdr. D. Colyer, D.F.C., 1.5.36. H. H. MacL. Fraser, to D.O.I., Dept. of C.A.S., Air Ministry, 1.4.36. R. L. Stevenson, M.B.E., to Armament Group Headquarters, Eastchurch; for Armament duties vice Wing Cdr. W. E. G. Bryant, M.B.E., 3.5.36. W. E. G. Bryant, M.B.E., to D. of T., Dept. of A.M.P., Air Ministry, 10.5 36.

Squadron Leaders.—R. J. Rodwell, to No. 1 School of Technical Training (Apprentices), Halton; for Engineer duties in No. 2 Apprentices Wing, 1.5.36. B. H. C. Russell, to No. 3 Flying Training School, Grantham; for Flying duties in Advanced Training Squadron, 5.5.36. Acting Wing Cdr. W. F. Dickson, D.S.O., O.B.E., A.F.C., to R.A.F. Staff College, Andover; for duty as Instructor vice Wing Cdr. H. E. P. Wigglesworth, 6.4.36. R. Ivelaw-Chapman, D.F.C., A.F.C., to No. 6 Flying Training School, Netheravon; for flying duties, 11.5.36. N. S. Paynter, to D.O.I., Dept. of C.A.S., Air Ministry, vice Sqn. Ldr. R. Ivelaw-Chapman, D.F.C., A.F.C., 11.5.36. B. E. Embry, A.F.C., to Headquarters, R.A.F., India, Simla; for Air Staff duties, 13.3.36. H. A. Hamersley, M.C., to Station Flight, Northolt; for Flying duties, 1.5.36.

Flight Lieutenants.—W. M. C. Kennedy, to Special Duty List; on exchange with South African Air Force Officer, 24.4.36. A. D. Grace, to Straits Settlements Volunteer Air Force, Singapore, 24.4.36. H. G. Wheeler, to No. 60 (B) Squadron, Kohat, India, 6.3.36. R. C. Reynell, to No. 8 Flying Training School, Montrose, 4.5.36. R. H. Hobbs, to No. 10 Flying Training School, Tern Hill, 4.5.36. H. D. McGregor, to D.D.R.M., Dept. of A.M.R.D., Air Ministry, 30.4.36. W. E. Rankin, to No. 48 (G.R.) Squadron, Manston, 25.4.36. D. J. Alvey, to No. 2 Flying Training School, Digby, 3.5.36. I. A. Critchley, to No. 8 Flying Training School, Montrose, 7.5.36. W. M. Hargreaves, to No. 215 (B) Squadron, Upper Heyford, 1.5.36. H. G. Blair, to Electrical and Wireless School, Cranwell, 26.4.36. R. A. McMurtrie and W. D. J. Michie, to No. 201 (F.B.) Squadron, Calshot, 1.5.36. P. Slocombe and B. Paddon, to No. 209 (F.B.) Squadron, Felixstowe, 1.5.36. A. W. Vincent, to Electrical and Wireless School, Cranwell, 28.4.36. G. F. Alexander, to No. 8 Flying Training School, Montrose, 14.4.36. P. de C. Festing Smith, to Air Observers' School, North Coates Fitties, 2.5.36. A. E. Paish, to Aircraft Depot, Karachi, India, 2.4.36.

Flying Officers.—J. S. Bartlett, to No. 607 (Co. of Durham) (B) Squadron, 4.5.36. C. R. J. Pink, to No. 601 (Co. of London) (F) Squadron, 6.5.36. A. C. Martin, G. L. S. Griffith-Jones, P. H. Holmes, H. G. Leonard-Williams, C. C. Morton, M. K. D. Porter, A. G. Powell, P. R. Robinson, C. M. Stewart, and I. A. Scott, to Electrical and Wireless School, Cranwell, 27.4.36. G. W. Montagu, to No. 822 (F.S.R.) Squadron, 29.3.36. D. Saward, to R.A.F. Station, Biggin Hill, 28.4.36. L. V. Spencer, to No. 8 Flying Training School, Montrose, 4.5.36. J. G. Davis, to No. 10 Flying Training School, Tern Hill, 4.5.36. B. K. Burnett, to No. 11 Flying Training School, Wittering, 4.5.36. R. H. E. Emson, to No. 2 Armament Training Camp, North Coates Fitties, 30.4.36.

Pilot Officers.—L. J. Stickley, to No. 28 (Army Co-operation) Squadron, Ambala, India, 16.3.36. A. R. Atkins, E. Banthorpe, J. A. Chorlton, R. E. X. Mack, P. J. K. Pike, and S. R. R. Smith, to No. 48 (G.R.) Squadron, Manston, 25.4.36. B. H. Boon, to No. 38 (B) Squadron, Mildenhall, 4.5.36. A. H. Donaldson, to No. 24 (Comm.) Squadron, Hendon, 4.5.36. J. B. Brolly and W. I. Hammond, to No. 201 (F.B.) Squadron, Calshot, 1.5.36. R. A. I. Harrison and A. J. Mason, to No. 209 (F.B.) Squadron, Felixstowe, 1.5.36.

Acting Pilot Officers.—C. L. Olsson, to No. 7 Flying Training School, Peterborough, 2.5.36. G. R. Fielder and S. R. Gibbs, to No. 7 Flying Training School, Peterborough, 30.4.36. F. R. McAllister, to No. 15 (B) Squadron, Abingdon, 27.4.36. N. F. Eagleton, to No. 6 Flying Training School, Netheravon, 28.4.36.

The undermentioned are posted to the R.A.F. Depot, Uxbridge, on appointment to short service commissions as Acting Pilot Officers on probation, with effect from 20.4.36:—G. R. Fielder, S. R. Gibbs, L. M. Blome-Jones, P. J. Emerton, J. W. S. Fowler, J. P. Hopkins, F. A. Ives, P. N. Jennings, N. B. Mole, A. R. Pruddah, F. O. Thresher, M. L. Wells, A. T. B. Campling, F. L. Chadwick, D. L. England, J. F. Grey, J. M. Holden, D. P. Hughes, L. V. James, R. A. L. Knight, M. P. Richards, F. W. S. Turner, P. F. Webster.

Stores Branch

Wing Commander.—N. R. Fuller, to Headquarters, R.A.F., Aden Command; for duty as Senior Equipment (Stores) Staff Officer vice Wing Cdr. W. C. Clark, 5.3.36.

Flight Lieutenants.—J. E. Truss, M.C., and P. P. S. Rickard, to D. of E., Dept. of A.M.S.O., Air Ministry, 4.5.36. F. D. D. Gaussen, to Administrative Wing, Cranwell, 6.5.36. C. J. Nobbs and W. G. S. Wood, to No. 23 (Training) Group Headquarters, Grantham, 6.5.36.

Flying Officer.—K. D. Stanion, to School of Store Accounting and Storekeeping, Cranwell, 14.4.36.

Accountant Branch

Flight Lieutenants.—C. Lorimer, to No. 7 Flying Training School, Peterborough, 27.4.36. H. R. Withers, to R.A.F. Station, Duxford, 4.5.36.

Pilot Officer.—R. O. Heath, to Marine Aircraft Experimental Establishment, Felixstowe, 28.4.36.

Medical Branch

Squadron Leader.—G. S. Strachan, to Special Duty List; whilst in interchange duty with the Royal Australian Air Force, 7.5.36.

Flight Lieutenant.—S. B. S. Smith, to R.A.F. Station, Biggin Hill, 8.5.36.

Chaplains Branch

Revd. P. J. Macken, to No. 5 Flying Training School, Sealand, 1.5.36. Revd. J. F. Cox, M.C., M.A., to Headquarters, R.A.F., Iraq Command, Hinaidi; for duty as Chaplain (C. of E.), 8.4.36.

THE AIRPORT MANAGER'S TASK

Air Commodore E. D. M. Robertson, C.B.E., D.F.C., Chief Officer of Croydon Airport, on Ensuring Efficiency and Economy in Airport Operation

(The Air Ministry, in permitting publication of this article, does not necessarily share the views expressed)

IN the following notes on airport management and control I have assumed that the manager is not directly connected with the operation of an air line. To assist him in running a large airport a manager will need a staff to enable him to perform the various functions required of him. The staff may consist of a general assistant, clerical and accountant staff, traffic hands or porters, warders or watchmen, transport drivers, firemen, telephonists, storemen, hall porters, stewardesses, and a communications staff. No explanation is needed of the duties of most of these persons, but remarks on a few will clarify their duties.

The traffic hands provide labour for loading and unloading aircraft, handling baggage, heavy cleaning work, sanitary work, lookouts, and the several odd duties about the airport, such as recording landings and housings. It should be noted that operating companies handle their aircraft on the ground and are responsible for the correct distribution of freight and for securing compartments.

Warders are necessary for the custody of property and the general good order at the airport. Uniformed officials are desirable for directing passengers and controlling the public.

Stewardesses assist lady passengers, are present in cases where a medical examination of such passengers may be required, and act as Customs searchers.

Broadly, the communications office is responsible for the correct dissemination of signals or information relating to arrivals and departures, booking messages, and navigational and fog regulation warnings. An efficient organisation to deal promptly with these matters is essential. In addition, the office may be used for the collection of statistics and for the receipt of landing fees.

The above list of personnel is typical, but is by no means rigid. At small airports some of the duties may be combined. If the airport deals with flying-boats as well as aeroplanes, other personnel, such as motor-boat crews and visual signalmen, may be needed.

Should a control exist at the airport, the wireless and meteorological personnel are, in this country, part of the Air Ministry organisation, but the control officers are generally employed by the aerodrome authority.

The Question of Finance

Whether an airport be owned by the Government or a municipality, or whether it be owned privately, the airport manager must always give careful consideration to finance. His outgoings will be heavy. In addition to his wages bill he must pay for maintenance of buildings and land, and stores, heat and lighting. As his airport is probably near a large town, land will be valuable and rates high.

Finality in airport layout, or even in the knowledge of airport layout, is far from being reached. The latest airport may well be out of date in ten or fifteen years' time, and so the airport manager must, in addition to depreciation, allow for obsolescence if a true balance of income and expenditure is to be reached. In fact, he has to make practical provision for obsolescence from time to time by carrying out alterations to his airport to meet changing requirements or to improve amenities.

The airport manager will derive his income from rents, landings and housings, and perhaps certain repayments for heating, lighting and alterations to meet tenants' requirements. In addition, he may sell certain rights, such as catering or car parking, and let part of his accommodation for shops and repair workshops.

With the present density of air traffic the income which operators can afford to pay will not meet the airport outgoings, and consequently the income from the ancillary services mentioned above is of importance. In fact, the airport manager may have to go in for entertainment and amusement if his incomings do not approximate to his outgoings. How far he should go in this direction will vary with circumstances. A Government or a municipality may be prepared to run an airport at a loss for the sake of the intangible items on the credit side, e.g., the national interest in aviation or else promotion of trade and attraction of tourists or business to the town. An airport owned privately or by a public company requires hard cash on the assets side, and so the entertainment aspect may be of more importance to such airports. Whatever the policy, it is to the good of air transport to attract the public, for by this means air travellers may be made.

In his organisation of his airport the manager will bear in mind three points, good order, safety and quickness of service. Air transport is growing so fast that good order and regularity are more than ever necessary. It is in the interest of all tenants, although restrictions are liable to irritate. A modern airport dealing with foreign traffic should have separate inland and foreign departure and arrival areas. The foreign area should be restricted to those directly concerned with the movement of foreign aircraft. Safety of life and property on the ground must be watched and fire regulations enforced. A hangar fire, apart from immediate loss, may do much to drive passengers to other airports or air lines, and damage that fragile plant, "goodwill," which necessarily has its place in all balance sheets, whether shown or not.

Terminal delay is one of the bugbears of air transport, and the manager should watch to see that none occurs in his organisation. Apart from these points he will, within his jurisdiction, do his best to see fair play between conflicting interests on the airport, but otherwise leave the tenants as far as possible to pursue their businesses.

The airport manager must watch the development of technical equipment for his airport, and must do his best to provide such items as may promote efficiency or to reduce his wages bill.

Whether the airport manager is directly concerned with control or not, he is keenly interested in the subject. Con-

trol is a means to assist the safety of, and therefore to promote, air travel; the ultimate safety depends on the skill of pilots, and on the organisation behind them which keeps their aircraft airworthy.

Control can supplement the work of the pilot in the following ways; by sending out warnings to aircraft approaching each other in poor visibility, by sending out navigational warnings to aircraft in flight (e.g., on such subjects as danger of ice formation or static electricity in a particular area), by giving bearings or positions by direction-finding wireless, by allotting turns to enter the approach area to an airport in thick weather, and, finally, by assisting an aeroplane, by means of wireless and signal bombs, to locate the aerodrome in bad weather. At night the control allots landing turns whatever the weather. The control enforces the flying regulations in the vicinity of the aerodrome in order to prevent collision. The control staff consists of one or more control officers, W/T staff, meteorologists, communications staffs and look-outs.

The Control Officer's Duty

Briefly, the present method of working is for the control officer to keep plotted on a map by means of coloured flags the position of aircraft within his area and to send out his warnings or advice as circumstances demand. The control officer must be alert, must sympathise with the pilot's viewpoint, make up his mind quickly and be good at mental calculations. At the same time he must be firm in dealing with contravention of airport regulations.

Wireless operators on a long route require to show a special form of ability. However good an operator may be, experience has shown that six months' transport operating experience are needed before he can be put in charge of the main traffic set.

Control is a post-war development. Something on similar lines was tried at one flying-boat station during the war, but wireless restrictions prevented anything more than elementary development. Like air transport, control cannot stand still, it must continually develop to meet new needs and increasing demands. The practice hitherto has been for the control to be situated in a tower overlooking the airport, and from here the control of aircraft both locally and along the route is practised. The indications are that before long these two functions will be separated and the control along the routes, called "strata" control, will move to a separate room where the staff will be free from the noise of engines running up, weather conditions, and the reports of lookouts. Here the strata control officer will be able to work under conditions most conducive to efficiency, and if the room be suitably situated, outgoing pilots, after visiting the meteorological office, will be able to see the traffic state along their routes. The local control officer will be responsible for flying in the vicinity of the airport. He will have under his control the airport lighting, landing beacon (if employed), the look-outs, and the wireless set for communication with aircraft approaching the airport in poor visibility. Close collaboration between the two control officers will be necessary.

Co-operation Important

Uniformity of control procedure, both for pilots and control officers in all parts of the country, is clearly desirable.

The interests of the air line operator and airport manager are, up to a point, identical, for both wish to see heavy traffic safely carried. Each must constantly work ahead to improvements and developments of his services.

With high regularity brought about by improvements in material the day may yet come when air transport can pay the manager his outgoings and some interest on his capital without forcing him to seek revenue from entertainment.

National League of Airmen

LORD LLOYD, Rear Admiral Sir Murray Sueter, Sir Patrick Hannon and Capt. Norman Macmillan will address a big gathering to be held by the National League of Airmen at 7.30 p.m. to-morrow at Birmingham Town Hall.

Testing the Villiers-Maya

AIRWORK has been bench-testing the new Villiers-Maya air-cooled four-cylinder engine, and will shortly be carrying out flight tests—probably in a Puss Moth. Low frontal area and immense solidity are two advantages claimed for this 130 h.p. inverted aero engine, which was fully described in *Flight* of April 23.

R.Ae.S. Presidential Elections

AT a council meeting of the Royal Aeronautical Society held on Tuesday of last week, Mr. H. E. Wimperis, Vice-President, C.B., C.B.E., M.A., F.R.Ae.S., Director of Research, Air Ministry, was elected President for the year 1936-37. At the same meeting Mr. F. Handley Page, C.B.E., F.R.Ae.S., was elected a Vice-President of the Society for the year 1936-37, and Major T. M. Barlow, M.Sc. (Eng.), M.Inst.C.E., M.I.Mech.E., F.R.Ae.S., was re-elected Vice-President for a further year of office.

Steel Scaffolding

NOT only in the construction of aircraft factories does steel scaffolding nowadays play a part, but in the assembling of large aircraft themselves. A number of the leading constructors, including Short Brothers, Ltd., are employing the products of the London and Midland Steel Scaffolding Co., Ltd., for the erection of assembly staging. Contracts are also held for a number of Government departments, including the R.A.E., Farnborough.

This firm's scaffolding employs the Burton patent "double-grip" safety coupler, which gives two grips on the upright tube and one on the ledger, or horizontal member. It is a one-piece fitting with no loose parts to become lost, and is stated to be very simple to assemble and extremely strong in use. All fittings are of drop-forged British steel.

Full details are obtainable from the Company at Iddesleigh House, Caxton Street, London, S.W.1.

The Lowe Wylde Fund

ON May 4 the Lowe Wylde Memorial Fund—to provide for the dependants of the late Mr. C. H. Lowe Wylde—had reached a total of £714, the donations up to that date being as follows:—

	£	s.	d.
Short and Mason, Ltd.	3	3	0
L. S. Hallam by his Exors.	1	1	0
Eustace Watkins	1	1	0
Capt. H. E. Hazlehurst	1	1	0
George H. Dowty	1	1	0
W. E. Humphreys	1	1	0
C. G. H. Dunham	0	10	6

Further donations are still urgently required, and should be sent to Mr. E. G. Gordon England at the London Air Park, Feltham, Middlesex.

Accuracy in Presswork

IN their search for parts possessing the characteristics of light weight coupled with strength, aircraft manufacturers have, to an increasing degree, been attracted by the work of specialists in sheet-metal manipulation. One of the firms where a study of this class of business has been made is Henry Caton and Co., Ltd., Britannia Works, Paynes Lane, Coventry. Here, any metal that is capable of withstanding the stresses involved, and of any shape that it is possible to form by means of presswork, can be dealt with. The only limits that are imposed are those of size and weight, but jobs up to 16ft. and plate up to ¼in. can be handled, while the factory equipment includes machines ranging from the smallest to those working at pressures of 500 tons.

Power presses of many types and capacities are installed, among them being a battery of hydraulic presses which deal those metals which it may be unwise to subject to instantaneous and drastic alterations in shape.

The works in Paynes Lane have recently been reorganised in order to deal expeditiously with urgent work. Limits of accuracy are very carefully adhered to, strict supervision and examination of all work being insisted upon all the time.

The firm has had considerable experience in turning out work for the motor trade and the War Office, and is fully equipped to supply the many varieties of pressings used in modern aircraft construction. Skilled craftsmen who work by hand are also a part of the organisation.

AT the STOCKHOLM SHOW

A Fine British Engine Display but a Hardly Representative Aircraft Exhibit : Much British Equipment on Foreign Machines : Germany's Comprehensive Exhibit

(Illustrated by *Flight* photographs)

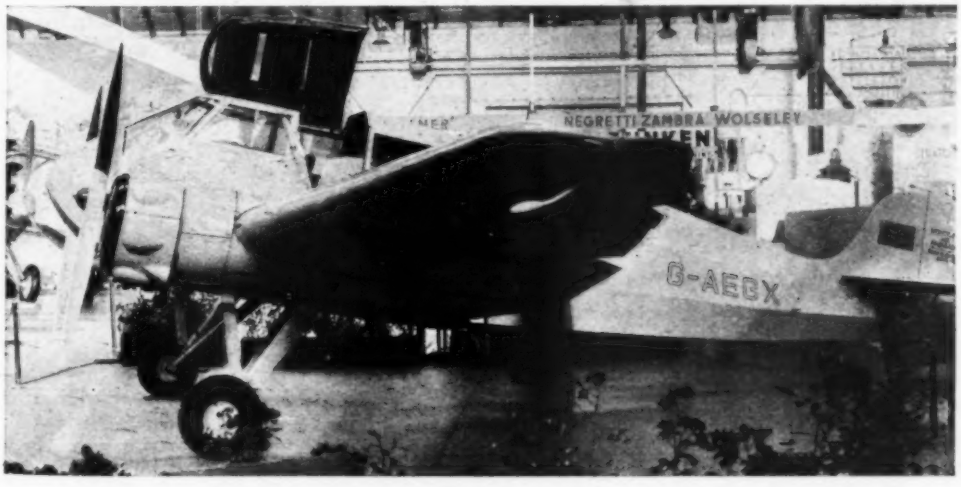
A general view of the Stockholm Show buildings. The German exhibits are collected in the hangar on the right.

LAST Friday His Majesty Ling Gustav V opened the 1936 Swedish Aero Show before an enthusiastic and interested public. The interest shown at once made it apparent that the efforts of Mr. Angström (chief technical officer of the Swedish Air Ministry and Secretary of the Exhibition) and of Capt. Florman (head of Aerotransport A.B.), together with a vigorous campaign by the Government and private individuals to provide aerodromes and landing grounds, has resulted in a wave of enthusiasm for flying, both commercial and private.

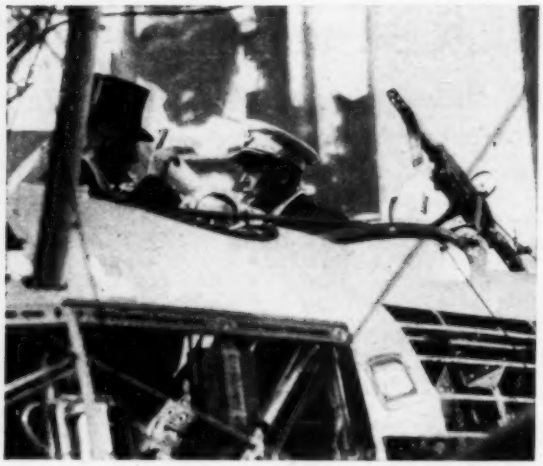
This year's exhibition—which continues until June 1—is being held at Lindarängen, the seaplane base which lies about a mile to the north-east of the capital, and the buildings comprise the old skating rink (now the Aerotransport seaplane hangar), and another slightly smaller building put up to accommodate the huge German exhibit. Various additions have been made in the shape of tents and temporary buildings, added to which are the permanent restaurant, the landing stages and slipway.

For all practical purposes the show may be divided into two parts, the general international section and the German section. So large is the latter, and so thoroughly comprehensive, that it is impossible to include it in a report as a "stand"; it forms an exhibition of itself.

To deal first with the "general" section, occupying the centre of the lofty hall is the British exhibit, laid out in the typically sound manner expected of it, and, in fact, failing in only one aspect—it is far too small. It is a pity that only one complete British-built machine, the Monospar Ambulance, is



The Monospar Ambulance (two Pobjoys) should find many applications in Scandinavia.



King Gustav and General Friis, chief of the Swedish Air Force, discuss the Pegasus-Hart.

The Swedish Minister of Defence, Herr Wennerström, and Swedish Army officers inspect the model of the H.P.53.

on view as against the many and varied aircraft of other nations. There is, however, some compensation in the number and obvious quality of aero motors from England.

The Bristol stand is impressively laid out with three beautiful engines on pedestals, and a number of photographs of the new Bristol high-speed bomber and the bomber transport. There are a Pegasus X, rated at 900 b.h.p., a Mercury VII, rated at 730, and an Aquila sleeve valve (civil version), which gives 550 b.h.p., and makes very little noise while so doing. On this stand there is also a glass case containing examples of standard finished parts from the Bristol machine shops, and these are attracting an enormous amount of attention. Mr. Holt, in charge of the Bristol stand, took us over the Nohab stand, where a British-built and sectioned Pegasus, complete with small red lamps to indicate the firing points, was being driven from an electric motor. Here also are Bristol engines built under licence by Nohabs, which is a branch of Bofors Aktiebolaget, the armament firm.

Actually it was remarkable to see the number of Bristol motors built under licence and installed in various machines. We counted four different Bristol engines on the stands of four different countries, and each one had been built under licence. Mr. Holt said that the average time taken to develop and complete an engine from the "raw metal up" is about three years; which just shows it is not so easy to "copy" as might be imagined. An exception to this rule, however, was the Czechoslovakian Walter concern, which created a record by type-testing an engine built from Bristol designs in one year.

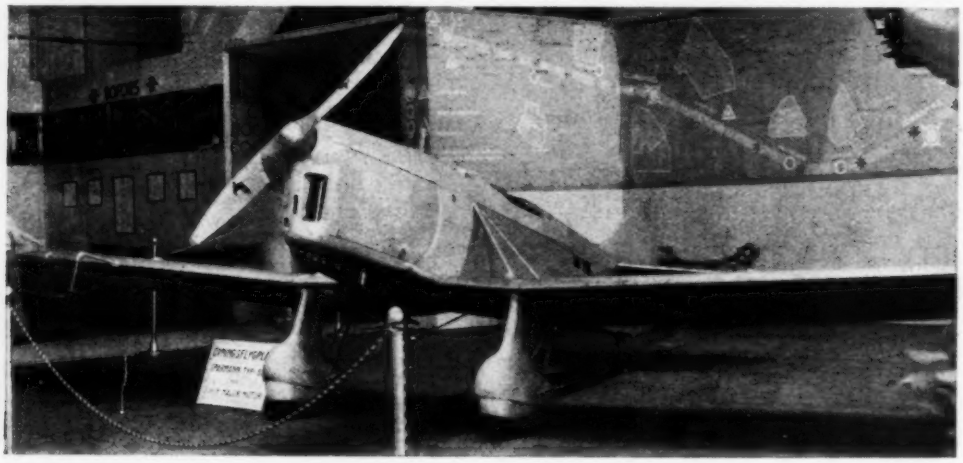
The Dunlop Rubber Company, Ltd., show their range of tail wheels, tyres, brakes, etc., and a special point is made of the Ecta discharging tail wheel tyre. A milliammetre connected with a small electrical current serves to show how current passes through one half of the specially constructed tyre, while no current can pass through the half of the wheel made of ordinary rubber.

The De Havilland Aircraft Co., Ltd., show a Gipsy Six engine, specially finished, complete with sectioned and cutaway engine nacelle, the whole forming quite the most striking individual exhibit in the show. Mr. Buckingham is being kept very busy answering questions, and he told us he had a Dragonfly ready for a host of demonstrations this week when the airport is opened. Aeromaterials A.B. are the agents for De Havilland products, and with the opening-up of the country for general flying, they should be kept busy supplying small air liners and private machines. A beautiful model of the Comet is a great attraction on the D.H. stand.

British Finish

An unusual finish for the airscrew bosses—bright purple—attracted the eye to the Armstrong Siddeley stand, where a closer inspection again emphasised the excellent finish provided as standard on British engines. The very neat rocker gear covers and attachments attracted considerable comment, and the photographs of the various types of Armstrong Whitworth aircraft were a centre of interest.

The name of Rolls-Royce means just the same in Sweden as it does everywhere else, and the part-sectioned Kestrel XVI, mounted on a small cradle stand of the usual Rolls-Royce character, was the Mecca of schoolboy and engineer alike. The fact that the new Junkers twin-engined air liner may be fitted with Kestrels as optional equipment, and the fitting of the same type of engine in a Heinkel monoplane transport re-



A Swedish trainer, the Sparmann S.1A single-seater with Gipsy Major engine. The general layout is reminiscent of the Breda.

In the German hall : The machine in the foreground is the B.F.W. Messerschmitt 108 B, and behind it is the Junkers Ju.86, with two Jumo diesel engines.

cently, are, perhaps, reasons why a large number of Germans are visiting this stand.

Napiers show the well-known show-model Rapier and Dagger, the compact arrangement of which surprised many not aware that this type of engine was in existence, it being obvious that an air-cooled engine has many advantages in this part of the world. A neat layout of the main engine components in a glass case results in the mysteries of the twin-crankshaft engine becoming clear to many; and yet again we must comment on the finish of the standard machined parts.

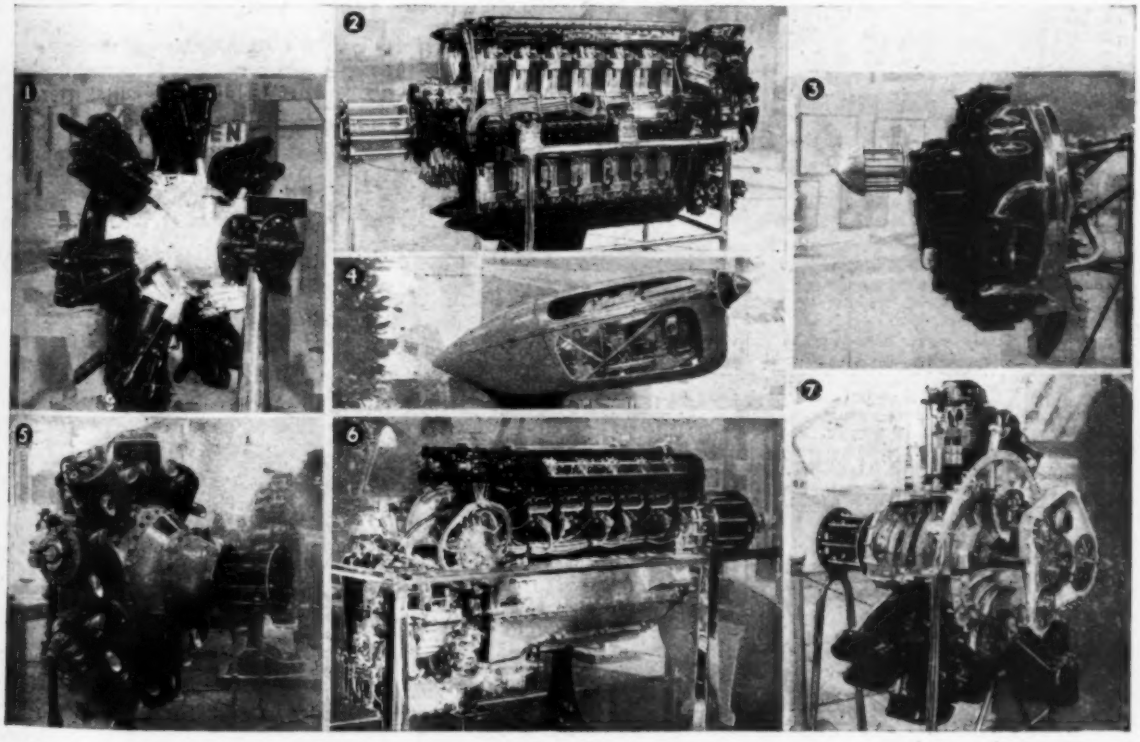
Wolseley Motors, Ltd., show the Aquarius, the Aries, the Scorpio and the Libra, which represent the best medium-horse-power small-diameter practice. The stand is well arranged and the motors should have a market for medium-sized air liners for Scandinavian internal routes.

Negretti and Zambra are prominent in the British section with a range of boost gauges, thermometers, etc., and also show examples of capilliary and steel bourdon tubes for instrument lines. Sectioned parts and diaphragms give an insight into the intricacies of aircraft instruments. The Palmer stand, and that of Dowtys, next to it, are a centre of interest all the time, and Comdr. Dove is having a busy time showing off the retractable Dowty wheel of the Heston Phoenix—which excellent component, incidentally, incorporates no flexible couplings or tubing in its construction.

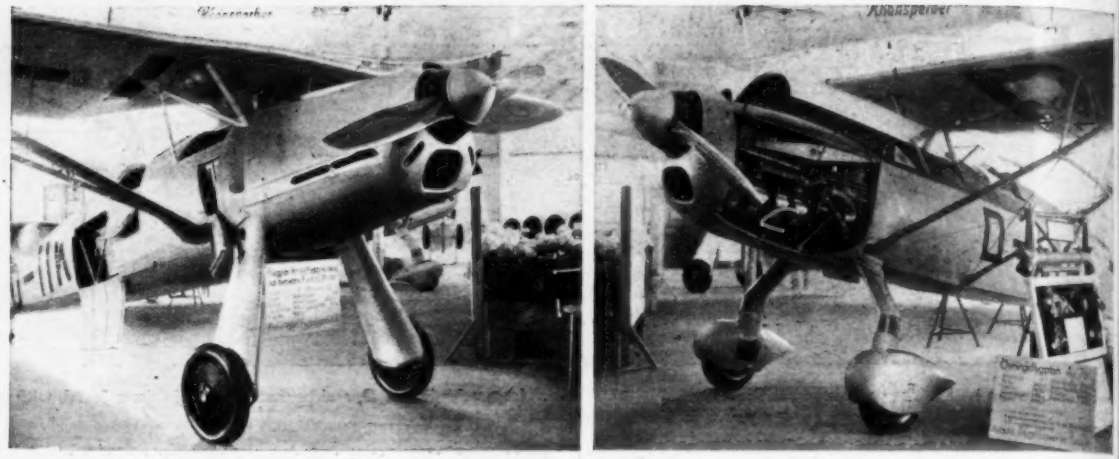
Short and Mason show their usual well-known range of barographs and meteorological instruments, and Wellworthys, of piston-ring fame, have taken a nice stand and fitted it up very well—a good show so far from home.

Handley Page, Ltd., have received an order from the Swedish government for several of the new Type 53 Transport Bomber, and a model of this machine is on view. The neat electrical bomb release system made by the same firm is also a centre of interest and trial.

As already observed the only complete British-built aircraft in the Show is the General Aircraft Monospar Ambulance, and



British Aero Engines at the Show : (1) the Siddeley Cheetah IX ; (2) the Napier-Halford Dagger ; (3) the Pobjoy Cataract III ; (4) the Gipsy Six in its nacelle ; (5) the Bristol Aquila sleeve-valve engine ; (6) the Rolls-Royce Kestrel XVI ; (7) the part-sectioned Wolseley Aries.



New Trouser Fashions at Stockholm : On the left is the Focke-Wulf fighter trainer F.W.56 with 240 h.p. Argus engine. On the right is the Arado Ar.76 military trainer, with a similar engine.

on the opening day it was constantly surrounded by a large crowd. The fitting up of the interior is neatly and comfortably carried out and the white finish, with red crosses on the wings and tail, makes a striking ensemble.

Pobjoy Airmotors are represented by two engines, a Niagara III and a Cataract III, and by their genial sales manager, Mr. Shaylor. In view of the interest in light machines now being fostered in Sweden, it would seem that this is a good moment to show our lightest aircraft engine. Standard Radio had not arrived when we saw their stand, but Smiths had a full range

A model of the huge Dornier Do.20 flying boat, which will have a gross weight of 128,000 lb.

of instruments, landing lights, flexible piping, etc., on view.

Although they have no machine in the Exhibition, the Aeronca Agents, Skandinaviska Flyg A.B., have a very well-made model of quite large proportions, and Mr. Kirwan, of Aircraft Exchange and Mart, has brought a demonstrator to the airport. We later learned that Mr. Vilen, manager for Skandinaviska Flyg A.B., and Mr. Kirwan, had worked all night to get the actual Aeronca demonstration machine into the main hall of the biggest department store in Sweden, where it will doubtless be seen by many people. The Aeronca seems to have created a very good impression in Sweden, and at least one flying club has ordered several for school work.

Being the country of invitation, as it were, Sweden had found it expedient to put up a very good show, and one finds the Hart built under licence at the Linkoeping factory of A.B., Svenska Järnvägsverksstädernas Aeroplanavdelning, together with a skeleton fuselage and wing. The engine is a Bristol built under licence in Sweden by Nohab, and a pair of special skis are shown, for fitting to the existing axles. The Sparmann single-seater low-wing braced monoplane looks very clean and has an excellent aerobatic performance. Outside on the slipway the Sefyr high-wing cabin seaplane is shown. This machine has a Gipsy Six and has been used for film work all over Sweden recently.

Chief among the Finnish exhibits is that of the government-owned factory, known as the Suomi, which shows its Tuisku general-purpose two-seater military machine, fitted with Armstrong Siddeley Lynx IV c. It follows conventional lines, except that provision is made for severe-weather training and the carrying of skis for the crew in a special locker in the tail. The piping and engine controls are brought through the bulkhead in a very neat manner, and the whole machine is well finished. Several varieties of wooden airscrews were also shown, and a very light plywood float of large dimensions.

As regards Poland, D.W.L. show a tourist type to seat three. It is a high-wing cabin monoplane with Walter Major engine, and appears very much larger than a Leopard Moth of the same seating capacity. It has wheel brakes and folding wings and is constructed of welded tubes with a fabric covering. The very big PZL 23 day-bomber (Pegasus) is fitted with six large dummy bombs between the legs of the undercarriage, and a special type of prone bomber's nacelle beneath the fuselage. It is notable also for the mechanically operated slots extending from the fuselage outwards for about four feet.

The Polish PZL P11c, fitted with a Mercury VS 2 built under licence, is the only single-seater fighter in the Show. It has a high gull-type wing with the pilot's cockpit at the trailing edge at the bottom of the "V." The brakes are operated by very neat levers connected to rods passing down the legs of the undercarriage, which is not provided with an axle. There are four machine guns, two in the fuselage, firing through the airscrew, and two further out in the leading edge. The construction is of metal throughout and the plating is riveted-on; in some places, such as on the wings and tailplane, it is of finely corrugated section. The speed claim of 370 km./hr. (230 m.p.h.) appears modest; the machine looks as though it would do considerably more.

A neat 60 h.p. inverted four-cylinder engine is shown by Avia. It has a tandem drive at the rear for two Scintilla Vertex type magnetos and looks a sound little job throughout. Avia also show an R.K.17, rated at 355 b.h.p.

In the Czech exhibit, Walter show a full range of air-cooled engines, both inverted in line and radial. They corresponded with English equivalents right up the scale, there being a

(*Continued on page 552.*)

The Bücker Jungman two-seater trainer, and above it the Rhönsperber sailplane.

INSURANCE and AIR TRANSPORT

Capt. A. G. Lamplugh Writes on the Future of Aviation Insurance and the Implications of the Air Navigation Bill in Regard to the Subject

The author: Capt. A. G. Lamplugh, F.R.Ae.S., M.I.Ae.E., F.R.G.S., of the British Aviation Insurance Co., Ltd., needs no introduction to those in the flying movement; a pilot of considerable experience, he fulfils a number of important posts, being *inter alia*, Warden of the G.A.P.A.N., President of the London Gliding Club, and a member of the Civil Airworthiness Committee.

IT has been truly said that insurance has done much to stabilise the rather exceptional hazards of aviation. It is already an effective influence in encouraging the sound and economic design and operation of aircraft, and will continue to be so.

In almost all its aspects aviation is an expensive and uneconomic business, and those who have pioneered and have dedicated their lives to the development of civil air transport as an important factor in the peaceful development of civilisation realise that any influence that can be brought to bear to stabilise and economise operation must be for the ultimate good of the whole business. The Gorell Committee, for instance, has proposed to hand over, or perhaps more correctly to delegate, certain powers previously held by the Air Ministry to a body of representatives of underwriters, operators and constructors, and one of the underlying reasons for the acceptance of this doctrine by the Air Ministry is that it must tend to encourage the economic influence of aviation both in design, construction and operation. I would like to stress the importance of desirable economy in developing the business, in which hundreds of thousands of pounds—in fact, it would not be an exaggeration to say millions—have been wasted through sheer ignorance of what is or what is not reasonably safe and practical.

Aviation has burst (or, perhaps more literally, has crashed) upon a world of transport which, generally speaking, was well appreciated by the whole community, and the insurance world in general is trying to assimilate or digest a form of hazard of which it has no previous experience. In years to come, of course, the insurance world will have absorbed and appreciated a knowledge of aviation much as it has done of other forms of transport, but unless aircraft constructors and operators are going to consider these important factors there is no doubt whatever that the present tendency to increase insurance rates will continue. In a few years' time, if we look back upon the last two or three years, we shall in all probability find the insurance of other forms of transport has provided an indirect subsidy to aviation not far below that of the subsidies provided by the Government.

Sharing the Burden

His late Majesty King George the Fifth once recalled the truth that insurance is no more than laying the burdens and misfortunes of the few upon the shoulders of the many. The main purpose of this article is to emphasise with all earnestness the desire to proceed with our technical development in a manner which shall at all costs avoid imposing an unnecessary and wasteful burden upon the community; and this applies to every individual engaged, whether professionally or privately, in the business. Design can and must be considered more in the light of easy handling, maintenance and repairs.

The aircraft operator and his pilot must also take a large share of praise or blame in skill and economy in operation. To give them a fair chance we must so revise our regulations of design, construction and operation that the same standards of safety shall exist (if not be increased)—but with a very drastic cut in the cost of these services.

It is too early as yet to forecast with any degree of certainty what will be the effect of the insurance provisions of the Air Navigation Bill. Broadly speaking, the present position is that the owner of the machine is liable to an unlimited extent, irrespective of whether he is guilty of gross negligence, negligence, or no negligence. Under the new Act his liability under the last two headings will be limited to a maximum of from £5,000 to £25,000, according to the size of the machine which he is operating. Under the first heading, his liability will remain unlimited as at present.

In theory, therefore, the new Act should decrease the liability of the aircraft owner and operator, but in practice it is unwise to assume that this will prove to be the case. Compulsory insurance for road transport has led to a greatly increased number of claims and a great increase in the amount of damages awarded in the courts. If this is the case in instances where the plaintiff has to prove negligence before he can recover, it is probably a fair assumption that it will be even more the case as regards aircraft, where the plaintiff has not got to prove negligence.

A Two-edged Sword

Aviation insurers will naturally be anxious to avoid increasing third-party premium rates. This is not a question of altruism, but of sheer business common sense. The increase of aviation insurance business is bound up with the increase of civil aviation, and the imposition of any burden tending to discourage the growth of civil aviation automatically recoils upon the insurers. On the other hand, it must be borne in mind that, at the moment, the cost of insurance is divided between a very small number of insured, as compared with motor car insurance for example. It follows logically that if there should be a series of disasters involving third-party damage, or even one major disaster, the market would be bound to be adversely affected. So far aviation in this country has been fortunate in avoiding such occurrences, and if the provisions of the Bill pass into law in their present form we can only hope that this immunity may continue, at any rate until such time as civil aviation has become more firmly established, so that the risk can be spread over a reasonable number of insureds.

I conclude by repeating again the maxim that "insurance is no more than laying the burdens and misfortunes of the few upon the shoulders of the many," and by expressing the hope that as the result of the new Act the misfortunes may be rendered fewer and the shoulders rendered both broader and more multitudinous.

Private Flying

Topics of the Day

Cruising Altitude

ONE very simple little point, I find, sometimes upsets the novice who is making his early cross-country flights. Filled with a commendable caution, he flies too high, with the idea that he will obtain a good view of landmarks in general and will stand a better chance of pulling off a forced landing.

In actual fact he will do neither. When flying at three thousand or so in anything but pluperfect visibility the landmarks will be vague and formless, and he will not obtain a very accurate notion of the distance which he is off-course when a check is made. A multitude of different railway lines and roads will always be worrying unless the pilot is sufficiently low to be able to pick up firm and obvious differences in their characteristics.

So far as forced landings are concerned there are two good reasons why the high flyer is much worse off than the pilot who stays at a medium altitude. It is quite impossible for him to see at once whether a field is reasonably practicable, even if the considerable height does allow him a much more varied choice, and high flying always upsets approach judgment to a very marked degree.

Try a straightforward approach to a familiar aerodrome from 3,000 feet and I'll guarantee that your last turn will be made too high or too near the boundary—and it is surprisingly difficult to get rid of height at the last minute without resorting to low turns and excessively steep sideslips, from which one usually emerges with too much speed for comfort in entering small fields.

Suiting the Circumstances

GENERALLY speaking, the best cross-country height lies somewhere between 1,000 and 1,500 feet, according to the type of terrain over which one is flying and to the prevailing visibility.

Needless to say, one must necessarily fly high over heavily wooded country or over water for the simple reason that it might otherwise be impossible to reach an open space or a ship in case of trouble. I shall not forget the pleasure and absolute terror that I felt as a passenger during a race in which my pilot flew at an altitude of inches over Savernake Forest, descending as the trees fell away and climbing as they climbed or grew taller. We were flying at full throttle and there was not a hope of doing more than perch on the topmost branches if the engine had cut.

Over rolling grassland, or, for instance, parts of Salisbury Plain, it is perfectly safe and very pleasant to fly at six or seven hundred feet—above ground level and *not* on the altimeter. It is advisable, however, even in these days of reliable engines, to retain a knowledge of the direction of the wind clearly in one's mind. I usually think of the direction in which I have to turn in order to get into wind, since there is very little time to consider the matter on the spur of the moment. Before leaving the aerodrome, in any case, I habitually note the position of the compass needle after turning into wind, so that, if the worst comes to the worst, I have at least got an approximate idea of this direction. I was taught—rightly, I consider—to turn into wind as an absolute and unvarying preliminary to any field examination during forced-landing practice. All the possible fields could then be quickly scanned on a basis of their immediate value and not on that of their all-round value as landing grounds.

Seeing the World

NO flying is quite so pleasant, exciting and interesting as that carried out at a fairly low altitude. Not only does one obtain some reasonable impression of speed and, consequently, of "going places," but one also has a chance of a surprisingly thorough investigation of earthly matters.

During a recent trip carried out, perforce, at a low altitude, I saw a private landing ground complete with windsock and camouflaged aeroplane, which I certainly hadn't noticed on previous passages over the same area; one interesting Roman encampment; two minor motor accidents—one of which was almost in the very act of taking place; and a host of entertaining country estates.

So far as the people on the ground are concerned, an aeroplane, however noisy, which appears and disappears more or less over the tree tops is more interesting and far less irritating than one which drones quietly and apparently interminably as it crosses five miles or more of cloudless sky; too high to be seen properly and too low to be unheard and unobserved.

For Idle Roaming

INCIDENTALLY, something pusher, on Drone but droneless lines, would be an extremely pleasant vehicle for aerial meandering, which might be such a pleasant pastime if there were no twin bogies of possible forced landings and actual engine noise. Hence my jealousy of the sailplaning fraternity, though I am lazy enough to want to do it from a nearby aerodrome and to do it when I want to, and not when the wind is blowing in the right direction.

I can think of nothing pleasanter than drifting quietly, at two hundred feet, over the English countryside on a hot summer's day, and I am irresistibly reminded of a paragraph in that excellent, though somewhat naïve, book by Capt. Macmillan, *Into the Blue*. During the period when he was an instructor at Chattis Hill he occasionally flew a Sopwith Pup, than which "there never was, and never can be, a nicer aeroplane," and he was describing the sensations of flying over Hampshire in mid-May. "The faint perfume of early summer scented the air and mingled with the tang of castor oil. Occasionally a plover flapped aside in sudden fright. . . . The Isle of Wight lay green across the waters of the Solent . . . and I . . . chased the long shadows down the woody dells of the New Forest on the homeward run."

INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

NEWCASTLE-UPON-TYNE

FIRST solos were made last week by Mr. C. Harvey and Lt. N. Bagshaw. Mr. A. R. Lucas completed his licence tests and Mr. J. B. Garland took his "B" licence. The total flying time was 62 hr. 7 min.

MIDLAND

Flying times for the week ending May 15 were 23 hr. dual and 30 hr. solo. Messrs. Kelley, Curry and Round became members.

LONDON

New members of the London Aerodrome Club include Mrs. R. C. Buxton and Messrs. E. C. Coaker, H. A. Glogauer, E. F. E. Howard, N. F. McLeod, R. J. B. Pearse and H. G. K. Waring.

REDHILL

Six machines attended the last Hanworth "dawn patrol" and two crews gained free breakfasts. There are eight new members and Mr. Slater has gone solo. Flying time for the week ending May 15 was 103 hr. 25 min.

BORDER

The Civic flight given by Mr. Harold Carr, the president of the Border Flying Club, to the Mayor of Carlisle and members of the aerodrome committee was a great success. The party was conveyed in four aircraft—two Railway Air Services' D.H.89's, one B.A. "Eagle," and one Gipsy Moth. The route was Carlisle-Isle of Man-Belfast-Prestwick-Carlisle, and by dint of an early start and accurate navigation the Moth managed to arrive at each of the stopping points first. The aerodrome is open to the public on May 23, Empire Air Day. All visitors, especially by air, are offered a hearty welcome. Two aircraft of the Border Flying Club attended the Dance and Display as guests of the Irish Aero Club on May 9, 10 and 11. Mr. Parry has joined as an Associate member.

LEEMING

The York and Leeming Flying Club has been added to the list of light aeroplane clubs to receive the Government subsidy. Yorkshire Aviation Services, Ltd., have added another blind-flying Gipsy Moth to their fleet and are expecting delivery of their Hillson-Praga in the course of the next few days. Mr. H. L. Brook set off from Leeming on Monday, May 4, on his flight in a Hillson-Praga for the Cape. He was escorted by six machines from the aerodrome for a short distance on his first stage to Lympne. The official opening day of York Municipal Aerodrome by the Secretary of State for Air has been fixed for July 4. The Y.A.S. Hangar is finished and the Club House is fast nearing completion. It is to be hoped that the Aerodrome will be available for visiting aircraft in the near future. The Yorkshire Aviation Services Country Club, Ltd., are giving lunch on Sunday, June 7, to the visitors from abroad for the International Air week-end sponsored by the Harrogate Aeroplane Club with the co-operation of the Harrogate Corporation. Flying time for the month to May 16 was 58 hr. 55 min. Messrs. Campbell and Harman took their "A" licences and Mr. Currey his "B" licence. New pupils are Messrs. Vincent, Wheatley, Hargreaves, Dossor, Sutcliffe-Smith and White.

WELL-DESERVED: Miss Jean Batten receiving the Britannia Trophy from the hands of Commander Perrin, the secretary of the Royal Aero Club, which awards the trophy for the most meritorious performance by a British pilot during the year.

C.A.C.S.

Last week-end members flew 4 hr. 45 min. dual and 5 hr. 45 min. solo. During the week five members flew to Lowestoft in connection with anti-aircraft training. Mr. Allais has gone solo.

READING

Six machines attended the "dawn patrol" at Hanworth last Sunday week. New pupils are the Hon. Sherman Stonor and Messrs. Broom and Clarke. Mr. Eugster and Mr. Dash have qualified to fly a Falcon. Mr. Rankin has taken delivery of his Falcon-Six. Last week's flying time was thirty-eight hours.

LIVERPOOL

Two B.A. Swallows with Pobjoy Cataract II engines have been added to the club's fleet and are proving exceptionally popular. Last Sunday thirty hours were flown by club machines. The map reading competition held on Sunday, May 3, was won by Mr. G. W. Huigh. The flying time for the month up to the 16th is 190 hr. 50 min.

EDINBURGH

Rather than attempt to compete with Turnhouse (No. 603 City of Edinburgh (B) Squadron, A.A.F.) on Empire Air Day, the Club has wisely decided to co-operate with the Auxiliary Squadron. Air Ministry approval has been obtained, and Club aircraft will be flown over to Turnhouse, some sixteen miles away, where joy rides will be provided for visitors.

SOUTH COAST

Last week's flying time was nearly fifty hours. Miss Broad and Mr. Cracknell, who are going after the "B" licence, have been doing a good deal of cross-country flying. A large party flew down from Croydon for dinner on Sunday and made a night flight back. New members include Dr. Douthwaite, and Messrs. Stevens, Cresswell, Middleton, Wakefield and Miller.

R.A.F.

The club will be closing down over the Whitsun Holiday from Saturday, May 30, to Tuesday, June 2, inclusive, during which period no flying will take place on Club machines from Hatfield Aerodrome. The following members have recently joined this club: F/O. G. A. E. Harkness, F/O. F. G. L. Bain, Sqn. Ldr. J. C. Brooke, and F/O. C. C. D. Williams.

YORKSHIRE

Club machines flew 71 hr. 30 min. last week, and on Sunday, May 10, set up a club record with twenty-four hours' flying. Messrs. L. S. Jackson and F. G. S. Ferrand have become flying members. New associate members include Mrs. F. G. S. Ferrand, Mrs. Savile Sykes, Miss E. Margaret Sykes, Mr. W. S. Harms and Mr. H. F. Kirby. Mr. R. V. Palmer has gone solo and Mr. R. E. Sharples has taken delivery of his B.A.C. Drone.

PORTSMOUTH

The B.A. Eagle and Swallow were demonstrated at the Club on Friday, May 15. Mr. James S. Daniel has become a member and first solo flights have been made by 2nd Lt. A. W. Rainey, R.N., Lt. D. Sanderson, R.N., Messrs. A. Skidmore and R. G. Worcester. Members of the English Speaking Union who were visiting places of interest in Portsmouth on Thursday, May 14, were flown over the town and entertained to tea by the club.

CAMBRIDGE

In the Cambridge report last week it was remarked that doubtless the 169 hr. 45 min. flying by Marshall's Flying School, Ltd., included charter and test flying. It is now learned that the times quoted represented training only. Actually the figure for the seven days ending May 10 was just over 181 hr.

Last week's flying times totalled 151 hr. 40 min. New members included Messrs. Wallace, Fuller and Riley Smith. Messrs. Carver and Bowring passed their "A" licence tests. Four more "A's" are expected this week.

BROOKLANDS

Club instructors and machines have been kept very busy this week coping with a rush of new pupils amongst whom are Messrs. V. A. Hunt, L. P. Bouverie, G. Gutterman, B. G. Murphy, A. E. G. Ortega and S. K. Roy. Miss Dorothy Kay and Messrs. R. G. Saville-Sneath, and U. Rusher, completed their tests for "A" licences. Trips to Shoreham for lunch and tea, especially in the Club Puss Moth, are now proving a popular daily event. Mr. Arthur Woods has presented a magnificent automatic radiogram to the Aero Club. The Brooklands Garden Party scheduled for June 20 will not take place owing to the extensive repairs to the aerodrome. The Cessna came over from Croydon on Sunday and Mr. Turner demonstrated it in great style.

Private Flying

HANWORTH

There will be a garden party on June 7 and the aerodrome will be open to the public on Empire Air Day, May 23. Flying times last week totalled 85 hr. 10 min. New members were Miss Peak Knight, Messrs. O'Neill, Nigel Watson, J. Wells and H. D. Rimmer. Messrs. W. R. Beatty and I. Bucheggar went solo and the "A" licence tests were passed by Messrs. L. Hanney, P. N. Veale and R. O. Lindesay. Mr. K. Buxton hired the Club's Spartan for some of his "B" licence tests.

MIDLAND GLIDING CLUB

After many months of waiting the club was able to hold its first real soaring meeting at the Long Mynd, Church Stretton, during the middle week-end of April, under the most happy circumstances and with equally happy results. The club has acquired twenty-five acres of moorland on a high ridge six miles long, known as the Long Mynd, at Church Stretton, and recently a substantial steel-girdered hangar, which is capable of holding as many as fifteen sailplanes, has been completed. At the present moment there are five brand-new machines in commission and three others are available. With this equipment members were able to obtain nine "C" and five "B" certificates at the first meeting, whilst a total flying time of over eighteen hours was recorded. Throughout the week-end passenger flights were made in a dual control side-by-side two-seater machine owned by Mr. Hardwick, which is invaluable for giving prospective "C" pilots a test on soaring before they are launched on their first solo flight from the hill. During the week-end in question the average limit of hill lift was approximately 1,200 ft. at the ridge, but on several occasions up currents under clouds lifted machines to heights well above 2,000 ft. These results indicate that this new soaring site is ideal, not only for training pilots, but for advanced soaring, as the great height of the ridge tends to merge the zones of hill and cloud lift, when an average breeze is blowing. Since the opening meeting five more "C" and four "B" certificates have been obtained by members and, although the winds have been unfavourable just recently, there is every prospect of intense activity throughout this summer on this hitherto lonely moorland height.

R.A.F. Flying Club's Display

Those who were contemplating a visit to the R.A.F. Flying Club's Display at Hatfield on June 6 should note that the event has been cancelled. The cancellation—which is due to Royal mourning—was announced in these pages some months ago, but the date was inadvertently retained in the diary of forthcoming events.

Harrogate's Foreign Guest Week-end

FINAL arrangements for the Guest Week-End, organised for June 5, 6 and 7 by the Harrogate Aeroplane Club, Newton House Aerodrome, Leeming, have been made. On Friday, June 5, the visitors will be met at Heston and will leave for Leeming during the afternoon.

On the next day, additional machines, including those from other clubs in the North of England and private owners, will assemble at Leeming not later than 11 a.m., and it is proposed to depart at 11.45 a.m. for Plompton, where machines will arrive at 12 o'clock. The party will then proceed by motor coach to the Grand Hotel, where a luncheon, which will be attended by the Mayor of Harrogate and members of the Corporation, will be given in honour of the visitors. In the afternoon an optional visit will be paid to the Yorkshire Aeroplane Club at Yeadon, and those foreign guests who wish to enjoy the amenities of Harrogate will be entertained by club members. On Sunday, June 7, the machines will leave Plompton and will fly to the aerodrome at York to be entertained by the Yorkshire Aviation Country Club.

The Club wishes to thank Herr Oskar Ursinus, editor of *Flugsport*, for his assistance, and Mr. Malone, of Airwork, for interesting foreign pilots.

AT the STOCKHOLM SHOW

(*Continued from page* 548)

"Major" four and six resembling the Gipsy, and a range of radials, built in some cases under licence from Bristol. The Praga Baby is on view, priced at about £450 (delivered in Stockholm) and interested the younger private owners very much.

Fokker is the only Dutch exhibitor, as was to be expected, and the new C.10 is on view at a very striking angle, complete with Hispano-Suiza and *moteur canon*. The enormous three-bladed metal variable-pitch airscrew is extremely impressive.

The rest of the main hall is taken up by steel tubing and special products, and the annexe holds a number of special exhibits, such as air transport and air services. The Swedish S.K.F. Company, of ball-bearing fame, are in evidence, and in this section also are A. B. Toys, a firm handling many British model aircraft and constructing several excellent ones of its own.

British Air Transport

British air transport interests are represented by British Continental Airways, who have been running a regular service to Scandinavia since the beginning of March.

Their participation takes the form of a joint exhibit with the various foreign air lines serving the Swedish capital. The exhibit—truly international in character—consists of a number of pillars (one for each company taking part) standing in front of a long wall on which the advance of civil aviation is graphically shown, the centre panel being a huge aerial view of Stockholm. An eye hole in the pillar gives an illuminated view of Croydon aerodrome, while a pointer connecting the pillar with the aerial view of Stockholm on the wall shows the various aerodromes on the route. A model of the D.H. 86 used by B.C.A. on their Scandinavian service is suspended between the pillar and the wall.

Housed as it is in its own compact, though large, building, the German exhibit is the best arranged and run in the whole show. More than forty-five firms are showing, and the number of sideshows is almost bewildering. Seven complete aircraft and one glider are on view, including the new Junkers Ju. 86 transport. This machine carries ten passengers for 650 miles at a cruising speed of 210 m.p.h. It has retractable undercarriage and landing lights and is fitted in this particular instance with the Junkers Jumo C.I. engines and three-bladed V.P. airscrews.

It is constructed entirely of metal and presents a remarkable appearance in the confined space of the exhibition buildings.

Bayerische Flugzeugwerke A.G. show an M.E. 8 Typhoon civil four-seater low-wing monoplane fitted with the Argus R.S. 10. The speed is given as something over 200 m.p.h. and the price as £1,500 in Stockholm, which seems so very little for a machine of this type that is was a source of comment and discussion among British exhibitors and visitors. Various intermediate and advanced training machines are shown, but nothing of outstanding interest or of a particularly new character. The Focke-Wulf Argus is shown as built by two different firms to the same general Government specification, and fitted with radio and machine guns for advanced and general training.

The Bü 131, fitted with inverted 80 h.p. Hirth, is shown in two-seater form. The single-seater is being demonstrated at Bromma this week. Not unlike the Tiger Moth in appearance it is very strongly built and has a high performance on only 80 h.p.

Among the aero motors on view are the Junkers Jumo, both complete with V.P. airscrew and in skeleton form, the eight-cylinder inverted Argus 10c, the Hirth 4.M. 60, and the Siemens 8.H.14a. All are typically German in the thoroughness with which they have been prepared for the show, and the Jumo especially attracts interest because of its special arrangement of working parts.

Outside the exhibition the Autogiros of Brie and Von Bahr are flying all day on joy rides, and two seaplanes were doing likewise from the slipway.

Altogether a very pleasantly arranged and efficiently run aircraft show, and one which should rouse the British Aircraft industry to action to see what can be done in London. The Swedish people are, as usual, extremely kind and hospitable, and nearly everybody has taken the trouble to employ representatives who speak two or three languages. Next Saturday the new Bromma Airport will be opened officially, and we shall be able to fly back to London in eight hours.

Scale Models

MR. V. J. G. Woodason, formerly chief engineer of the Model Transport Company, has gone into partnership with Mr. R. A. C. Holme, and within the last few weeks has been manufacturing models at Heston under the business title of "Woodason Aircraft Models." His workshop is on the ground floor of the former service hangar, and it contains at present several large models of Imperial Airways' new equipment in various stages of construction.

WHAT the OPERATOR WANTS

Representatives of Airline and Charter Firms Give their Opinions on Desiderata in Aircraft and Equipment : Ultra-high Speeds Not so Important as Economy

HIGH SPEED

—Not Necessarily the Main Requirement in Charter Work, Maintains Mr. L. H. Stace, Managing Director of Air Commerce, Ltd.

MUCH has been said in late years of the rapid expansion of airlines throughout the world, but little notice has been paid to the corresponding increase in the amount of private charter flying.

Manufacturers of aircraft in Great Britain have been quick to supply suitable flying equipment for the airline operator, and this is understandable, for big money is involved. A fleet of two-, three- or four-engined aircraft can cost many thousands of pounds, and it is obviously worth while to design and build "something better" for such a market.

In the case of private charter work one is not confronted with either large aircraft or large fleets, and possibly, for that reason alone, designers have not yet produced a machine that can be considered really suitable in all respects.

The average charter or "air taxi" operator requires a small aeroplane capable of carrying up to three passengers and ample luggage. A single engine of undoubted reliability is desired, and of about 150 h.p. The engine must of necessity be easy and cheap to maintain and capable of running long periods without attention if required.

The ideal machine should have a maximum range of about 800 miles, but it would be quite acceptable if this were to vary with the load, as in the case of the D.H.90.

Since a large percentage of charter work consists of flying for the Press and newsreel companies requiring aerial photographs, the aircraft should be a high-wing monoplane giving a good forward and downward view.

Another peculiarity of private charter flying is that, until every town has its own aerodrome, landings and take-offs have to be made in fields. This calls for a sturdy construction and a really good take-off. Most charter pilots can recall times when a field that was easy to land in caused them a few anxious minutes and a high blood-pressure in flying out by "pulling it off the ground" in a stalled condition and just clearing the hedge. Surely it is not too much to hope that an aeroplane can be made to take-off in something approximating to the distance it needs to land?

The only other point relates to cruising speed, and in this I feel that my views may diverge from those held by other operators. I consider that a high cruising speed is not of major importance, and an aircraft fulfilling all the foregoing ideals would suit me if it cruised at 130 m.p.h.

No mention has been made of instruments, stability, etc., owing to lack of space, but if any aircraft designer should be interested enough to desire my humble opinion on these matters I will gladly furnish them.

HAPPY MEDIUM

Capt. G. P. Olley Also Believes High Speeds Undesirable : He Would Prefer Large Commercial Loads

THERE are two obvious methods of running air services over comparatively short distances in a country which is well provided with means of surface transport. One is to use machines which are a great deal faster than anything at present available and to fly often; the other is to use comparatively slow machines carrying really large commercial loads. If performance is, to some extent, sacrificed, it should be possible to produce a machine which is a very good commercial proposition from the smaller operator's point of view.

In this way both passenger and freight charges could be brought nearer to surface transport standards, and the number of prospective air travellers and users would automatically increase. While this increase is, so to speak, coming along, the type of machine which I visualise would at least be a paying proposition when using a comparatively small proportion of its available capacity.

SPEED and ECONOMY

Some Interesting Requirements Suggested by Mr. P. W. Lynch-Blosse, Technical Adviser to British Airways, Ltd.

A LOW-WING all-metal monoplane may, perhaps, be regarded as the most convenient type for economical operation and ease of maintenance. The minimum cruising speed should be at least 150 m.p.h. For Continental and longer internal air lines the speed must be increased to at least 200 m.p.h. at 75 per cent. power. To a certain extent speed and economy are achieved together, without the necessity for increased horse-power, provided that the machine is "clean" aerodynamically, that V.P. air screws are fitted, and that the construction is light.

As extra speed is achieved without added horse-power, it is interesting to note that economy will be affected in the following ways: (*a*) Capital cost: provided that several machines are required for an airline, a reduction of about 20 per cent. on the number of machines of a slower type will be effected; (*b*) fuel consumption: about 20 per cent. in the fuel bill per trip; (*c*) maintenance: about 20 per cent. reduction in the maintenance bill per trip; (*d*) reduction of staff, since there will be fewer machines.

We are, generally speaking, in favour of two engines, but public opinion demands four, and the added safety factor swings the balance back to the four-engined type. It is essential that height should be maintained with full load at 3,000 ft. with half the engines stopped. It is also essential that higher-compression engines should be used. By using such engines and 87-octane fuel, an increase in power of at least 10 per cent. is obtained.

Tanks should accommodate sufficient fuel for a non-stop flight of 500 miles, or with alternative arrangements for 1,000 miles.

In the matter of details, there are several important aspects affecting passenger comfort. As regards heating systems, up to date we have found that air heated by the exhaust pipe has proved most satisfactory, but it is understood that electric heating systems are being introduced which are also very satisfactory. Electric systems may, however, be a disadvantage to radio and compasses. Particular care should be taken to ensure that all doors and windows should be as air-tight as possible.

The Pilots' Instruments

In the cockpit full dual control must be provided. Compasses (two) must be placed in the best position magnetically. Flying instruments should be mounted on a separate board, distant from the pilots' eyes about 18in. to 22in., and as high up as possible. It is realised that it would be impossible to mount them on a level with the pilots' eyes, which is ideal, but I think it will be found possible to mount the top instrument, which should be the directional gyro, about dead level with the pilot's chin. This instrument should be mounted exactly in front of the pilot, immediately underneath it should be a stand-by turn-and-bank indicator. Beside the directional gyro, on the right, should be the artificial horizon, and on the left side, reasonably near, and on the same instrument board, there should be an air-speed indicator and a sensitive altimeter on the right. A fore-and-aft level should be mounted somewhere on the same board.

These are the most important instruments, and, having mounted them in the positions stated, a single set of engine instruments can be mounted where they can be best seen and most conveniently fitted. This applies to the left-hand side, or captain's seat only. A similar board should be mounted on the right, containing an ordinary turn-and-bank indicator, fore-and-aft levels, A.S.I., and altimeter.

These, briefly, are the essentials for the cockpit: Good vision, especially when landing and in the tail-down position; airtight and watertight windows (though a portion should open to give the pilots vision ahead in bad visibility); flying instruments mounted as stated; accommodation for maps, papers, etc., and a table for the map; throttles mounted centrally, and brake levers on control columns. *Cockpits must be efficiently heated.*

A drift indicator is also essential to D.R. navigation, and, I think, should be incorporated in the design of the machine.

Radio Equipment

As no airline machines operate without wireless, it is essential that this should be designed into the machine. A space for the main set should be found well away from the compass and also away from the L.T. and H.T. leads to minimise interference. In addition, space must be provided for a small stand-by receiver, shelves for wireless spares, and a collapsible table for the operator. This means, of course, a complete wireless room, and it is quite essential that all wireless gear, winches, switches, meters, etc., be removed from the cockpit. Telephones between the pilot and wireless operator must be provided.

A condition of purchase should be the supply with machines of a complete set of drawings for use in the company's own repair and overhaul sections; also a full price list of spares.

TOO-HIGH COSTS

Capt. G. Birkett Speaks from Long Experience as a Charter Operator

JUDGING from my own experience, I would begin by saying that although the number of passengers carried has slowly increased, the cost of operation has tended to increase also, particularly since the too-optimistic view of the future of commercial aviation has loosened more capital and, consequently, more competition. This, in turn, has created a shortage of trained personnel; and added to this is the fact that the country is at last alive to the necessity for a large Air Force, so the supply of trained personnel from this source is now very restricted.

My experience is that the cost of operation of aircraft is far too high to allow operators to charge a reasonable fare and make a profit. Regard must be had to the other difficulties that beset operators, such as restricted business during the winter months, cancelled and incompleted flights owing to adverse weather, lack of suitable aerodromes, and international restrictions and regulations.

One of the chief reasons for the high cost of operation is the high initial cost of aeroplanes and equipment. This, in turn, makes the insurance, depreciation, and cost of spares too high. Therefore, *manufacturers must produce less expensive aeroplanes.*

Speed I place next in importance for consideration, as high speeds give more pay-miles per hour. It is the chief advantage that aviation has to offer.

Safety, which is, of course, important, involves several questions. One would obviously choose two engines instead of one, provided that the machine could climb on either with a full load, but for the fact that one's operating costs are nearly all increased.

The pilot's view is also of importance in this respect, and for single-engine machines I prefer a high-wing monoplane to anything else. A low landing speed is very helpful in the case of restricted visibility, although this will lose some of its importance when large aerodromes are more plentiful. The take-off run will also be of less importance as aerodromes are improved.

The passenger's comfort has been well provided for in most modern aeroplanes, but small machines are still very noisy and considerable improvement could be made in this respect.

Wireless, which is steadily becoming a necessity for all commercial machines, should be made easier to work by the pilot operating the wireless himself. Manufacturers should screen all aeroplanes that are likely to be used for commercial purposes.

Despite my past disappointments I still look forward to the day when manufacturers, freed from Air Ministry control, produce an aeroplane at a reasonable price; when the tax is taken off petrol used for aviation; when no restrictions—national or international—are placed on flying at over a certain height above prohibited areas (we can then go from A to B in a straight line); and when all towns have large aerodromes, properly equipped to allow blind landings and night flying. Then we shall see the development of commercial air service. May it be soon!

SHUTTLE SERVICE

On Converting the Casual Holidaymaker Into an Enthusiastic Advocate of Aviation : Comfortable, Uneventful aud Useful Trips at Less-than-joyride Rates : How the Isle of Wight Air Ferry is Operated

By JOHN GRIERSON (Chief Pilot, Portsmouth, Southsea and I.O.W. Aviation, Ltd.)

THE word "Ferry" as applied to flying may seem at first sight to imply a status of inferiority as compared with more lengthy services. But consider their differences—the long air line which must charge a high fare in order to carry a small number of passengers over a great distance, and the shuttle service transporting a horde of passengers for a dozen miles at less cost than a "joy-flip." May we not well find that it is the organisation which takes the larger number of passengers into the air in the most unthrilling manner possible that is rendering the greatest service to aviation at the present stage of development?

I say "in the most unthrilling manner possible" with feeling, because a short time ago I happened to travel as a passenger on an important airline. To begin with, it was found that more load was to be carried than had been anticipated, and the start was delayed twenty minutes whilst petrol was being jettisoned. We took off in a strong wind and the pilot flew his course with deadly accuracy beneath a low ceiling, making no effort to avoid the higher ground, where we were bumped violently. Then, in case any of the passengers had failed to be actively ill *en route*, the final approach was made with almost 90 deg. bank at 200ft. over a very populous area—and, of course, the wind was still blowing a good 35-40 m.p.h. It is such thrills as these that make the uninitiated swear "Never again for me!" and transform them into living advertisements for the dangers and discomforts which aviation, in common with other forms of transport, can be made to offer.

Conversion en Masse

Our job on the ferry consists of introducing the masses to air travel, and doing all in our power to make them like it. For instance, next Sunday, as I write, we have booked two ramblers' clubs for transport to the Island. Their total will not exceed sixty-five persons, which is a relatively small number, as already we have arranged to take parties of ninety and 130 across at future dates. However, the sixty-five are representative of the majority who fly on our ferry. Using an Envoy, a Courier and a Fox Moth, we shall transport that gathering to Ryde within the hour. If it is calm and fine we shall fly at 1,000ft., but if it is bumpy we shall climb higher. There will be no tight turns, and we hope that those ramblers will go home and tell their friends that flying is just like driving in a motor car.

We are dealing with the masses of the people, for there are few holidaymakers who cannot afford 6s. for a return ticket. These are not the sort of people who are ever likely to build or own their own private aeroplanes, but they are the bricks and mortar from which an air-minded nation could and should be built.

By careless handling we have it in our power to put thousands of would-be travellers off flying. We could give them a thoroughly bad impression of air transport and thus convince them and their friends that flying is an extremely dangerous stunt, only to be undertaken by so-called dare-devils. Indeed, we believe that in sending away a passenger after a comfortable and thrill-less flight, however short it may have been, and thus converting his prejudice into enthusiasm, we have accomplished more than does any record-breaking flight. I do not mean that record-breaking is not a most praiseworthy kind of flying, but to the average man it is a business of super-pilots and super-machines—a realm of aviation quite outside his ken. On the other hand, in this air ferry we are able to bring the use of aeroplanes almost to the doorstep of the average, and not necessarily wealthy, man and woman.

From the pilot's point of view the ferry is not nearly so monotonous as many imagine. Our life is frequently enlivened by the variety of our passengers, and the remarks they make. Such examples as the gentleman who was standing in the public enclosure when a machine was being taxied past may be cited as typical. Seeing his hat lifted off his head and sent flying, he was heard to mutter: "Coo-er, it's even more windy up here than down on the front!"

Not all of our flying is confined to the normal fifty flights per day on the ferry, of course, as we have twice-daily services to Southampton and Bournemouth, increasing to four and seven respectively later in the season, and there are also charter trips. Our aircraft consist of the Envoy and Wessex, which both carry eight passengers at cruising speeds of 150 and 105 m.p.h. respectively, three Couriers, which carry five passengers apiece at 135 m.p.h., and the Fox Moth, seating three or four with a cruising speed of 100 m.p.h. It will be seen that our service depends a great deal upon the efficiency of the Airspeed retractable undercarriage,* and this has proved itself a mechanism of outstanding strength and reliability. The gear is operated hydraulically, and its position is checked by red and green lights as well as by a horn which sounds if the engine is throttled back whilst the wheels are retracted. Even when the wheels are folded-in they protrude to such an extent that very little damage would be done in the event of a pilot disregarding both his warning signals and landing with the wheels up. This was proved by Sir Alan Cobham when he was forced to land at Malta and deemed it best not to release the wheels.

Special Charters

Apart from the ordinary routine, we have a contract to fly for the 4th Anti-Aircraft Brigade on fixed courses between certain heights. This is done either in a Courier or Envoy, since both are fitted with two-way telephony radio, and the pilot is thus in constant touch with the ground-force carrying out the exercise. There are also newspaper contracts for transporting loads of the *Portsmouth Evening News* to Cowes for distribution throughout the Isle of Wight. Last year we carried nearly 60,000 lb. of newspapers, including loads from London.

In our endeavour to give the passenger a smoother passage we are forced to pay strict attention to the localities in which bumps occur. As an example, there is a wooded

* In 1935 this gear made over 11,000 take-offs and 11,000 landings.

hill 250 feet high within two miles of Southampton aerodrome, flying on the direct course from Ryde, and which produces a most violent bump at 1,000ft., even in 10 m.p.h. winds. Since we cannot go to the expense of carrying out prolonged test flights in order to discover the exact details of wind speeds, directions and heights at which this very sudden bump occurs, we have to fall back on the simple expedient of flying around it. But there does seem to be ample scope for some of our glider enthusiasts to do a very useful and interesting job of work, in making extended tests over such vicinities. They might even prove their value to the materialists who keep asking the question: "What is the use of gliding?"

Our problems are very similar to those of the longer airlines. We are hampered in the same way as they by the iniquitous petrol tax, which is used to subsidise road transport. We also bear our share of loss caused by the difficulty and waste of time in getting pilots' licences endorsed for new types of aeroplanes by the Air Ministry. The greatest difference between us is in the number we carry. In this we have the advantage of being able to spread air-mindedness over a wider field which, if our work is good, will ultimate benefit the longer and more expensive lines.

CORRESPONDENCE

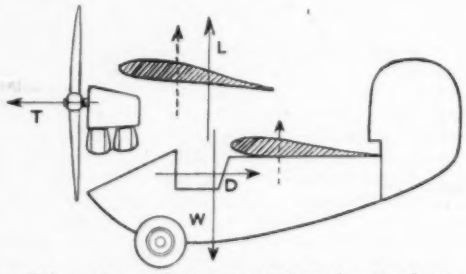
The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

POUCULIARITIES

YOUR editorial in the issue of May 7 suggests that there is something very mysterious about the behaviour of the *Pou-du-Ciel* in flight. Its peculiarities are, however, due to the following factors:—

1. Lack of inherent longitudinal stability.
2. Elevator control (front wing) too powerful and sensitive.
3. Elevator control too close to C.G. to give adequate "feel" to the pilot, and
4. Lift interference with rear wing by the front wing.

An elementary force diagram is drawn here, from which it is seen that T is, say, 1ft. above D, and for equilibrium L must be in front of W. Assuming a L/D ratio of 6 (the *Pou* wing arrangement is notoriously inefficient), L will be roughly 2in. forward of W.



Now L is made up of components from front and rear wing, the greater part of lift being supplied by the former.

The first feature to become apparent is that for horizontal flight (at uniform velocity) there can be very little range of speed, for L must remain equal to W whilst its position is governed by the magnitude of the T/D couple, or by T. For instance, if T is increased L must move forward, which in turn means that the incidence of the rear wing must be decreased more in proportion than that of the front wing, and this is difficult of achievement: for by decreasing the incidence of the front wing (for the higher speed), the downwash on to the rear wing is reduced, giving that wing a greater effective incidence, and hence L moves back, which is opposite to the desired effect.

From the little evidence available, it appears that the fatal accidents have taken place through sudden dives from a few hundred feet, at a point where the pilots commenced the landing approach. If we may assume, as seems reasonable, that the engine has been throttled back, there is a diminution of the T/D (nose-down) couple and the nose starts to rise. This tendency is aggravated by the increased effective incidence of the front wing due to loss of height, the effect having been modified by the time the flow (relative) meets the rear wing.

The pilot instinctively pushes forward on the stick, and, due to (2) and (3) above, probably brings L behind W, in other words he overshoots the mark (as is not unusual with pendulum-type elevators, which is what the pivoting wing virtually amounts to) and the nose falls. The correcting backward movement of the stick probably places the front wing in a stalled attitude, relative of course to the descending flight path, with considerable loss of lift on that wing. Concurrently the rear wing, relieved of the downwash from the front wing, experiences a sudden gain in lift, with the inevitable result that the aircraft dives to earth.

Thus it is seen that the system of forces provides a condition little removed from unstable equilibrum, and only by skilful juggling, or great luck, may disaster be avoided.

The take-off is made possible, incidentally, by the high position of T, which compensates for the forward position of L.

The safest method of landing would appear to be to fly the aircraft on to the ground with engine on, or alternatively the engine should be throttled back gently, whilst the stick is pushed slightly forward for the glide-in, but on no account should the stick be pulled back suddenly.

In conclusion, it is earnestly to be hoped that any drastic steps that may be taken to control the activities of this type aircraft should be limited to the Flying Flea so as not to hamper the progress of those types of light aeroplane that are being developed along more normal lines.

C. H. LATIMER-NEEDHAM, M.Sc.(Eng.), F.R.Ae.S.

Henlow, Beds.

[Mr. Latimer-Needham's ingenious explanation probably holds good when applied to *Poux* in general. The machine does appear to need a rather special flying technique compared with orthodox aircraft. The fact remains, however, that many machines of the type have been flown for very many hours without disclosing any tendency to go into a dive from which recovery is impossible.—ED.]

LANDING FEES

I AM grateful to Mr. C. A. Herring for further ventilating this subject, but I am afraid that he must only have scanned my original letter on the subject. Usually private pilots do spend money at the aerodromes which they visit, and they help to support their home aerodrome and frequently pay subscriptions to more than one club and so indirectly contribute towards the upkeep of a number of aerodromes. If the landing fee is to be small, the total amount raised is not likely to go far towards providing elaborate ground equipment, and if it is large private pilots will not go to those places where such fees are charged

I particularly complained because, having spent nearly 30s. at Bristol Airport, I was charged a 2s. landing fee, and objected to the principle.

It may interest Mr. Herring, and private pilots generally, to know that I have received a letter from one well-known airport to the effect that they did not, and never would, charge landing fees to club members, and that since the date on which I wrote my original letter I have landed at a number of places and have never been asked to pay a landing fee, so it would appear that the suggestion to do so, and its practice, has shown itself to be objectionable and to do more harm than good.

ERIC W. WALFORD.

Coventry.

DECLUTCHING THE PUPIL

THE letter appearing in *Flight* of May 8, on the subject of "declutching the pupil" reminds me that the old D.H.6 which was used for instructional purposes in the last year of the War was fitted with a trigger gear which permitted the instructor to render the pupil's stick and rudder-bar inoperative in an emergency.

Cases of "freezing-on" were by no means rare in those days, and instructors found the D.H. arrangement more effective and less barbarous than the earlier method of dealing with a panicky pupil, in which he was bashed on the head with a spanner, or had his crash helmet forced down over his eyes by a violent blow from behind. As far as I remember, the trigger device was quite simple, and I have often wondered why it has not been incorporated in present-day machines.

Watford. GRENVILLE G. O. MANTON.

ENGINES for COMMERCIAL AIRCRAFT

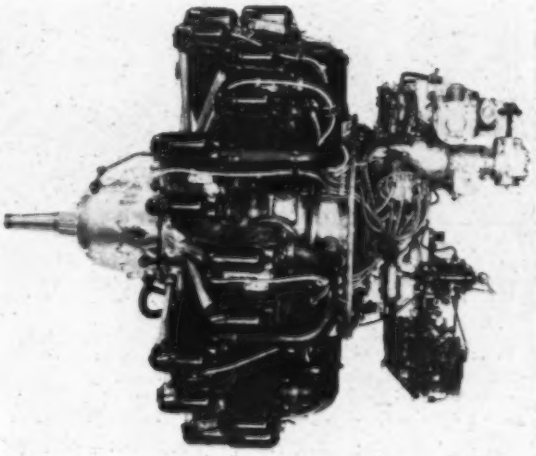
Britain's Unique Variety : The Advent of High-octane Fuels : More Supercharging

IMPERIAL AIRWAYS will power their new fleets of Empire flying boats and four-engined landplanes with engines operating on fuel of 87 octane number. This will be an innovation for this country and will doubtless precede the general adoption by the major air lines of power plants designed to benefit from the new fuel.

Most of the future commercial engines, excepting some of the smaller types, are likely not only to be designed for use with this fuel, but will incorporate provision for variable pitch airscrews. Two other features which are being demanded by the commercial operator are ease of access and generous provision of accessory drives.

We have lately had demonstrations of the astounding performances which can be attained with a combination of high-efficiency military type engines with a well-designed commercial aeroplane. Where sheer performance is desired there is an extraordinarily wide choice of power plants. For economy and ease of maintenance there are British engines the equals of which are not likely to appear in other countries for some time to come. Reliability is still, as always, one of the principal selling points of British engines.

The following review embraces engines which are available to the commercial operator at the present time.



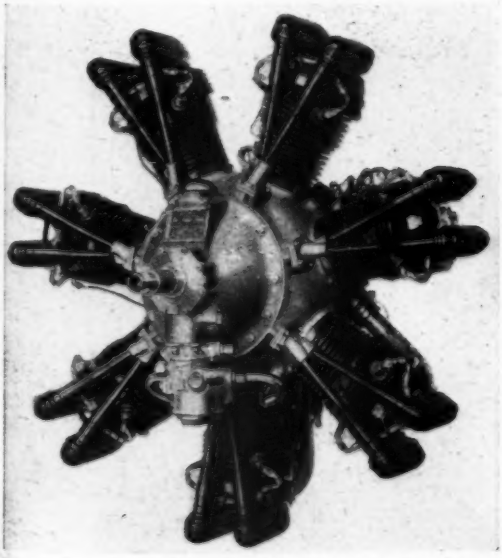
Four of these 790/880 h.p. Siddeley Tiger IX fourteen-cylinder medium supercharged radials driving V.P. airscrews will power Imperial Airways' new fleet of A.W. monoplanes.

ARMSTRONG SIDDELEY

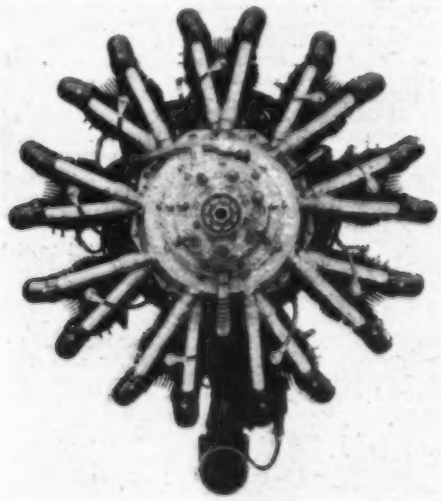
In the whole series of radial engines manufactured by the Armstrong Siddeley Company at Coventry there is not a single type which has not been, or is not being, adopted for commercial operation.

Perhaps the most interesting model at the moment is the big Mk. IX Tiger, a moderately supercharged fourteen-cylinder two-row type specified by Imperial Airways for the new Armstrong Whitworth four-engined landplanes now under construction. The Tiger IX is rated at 790 h.p. at 2,375 r.p.m. at 6,500 ft. For take-off, when the V.P. airscrew for which the engine is designed permits 2,375 r.p.m., the output is 880 h.p. The maximum power available in level flight is 804 h.p. at 2,450 r.p.m.

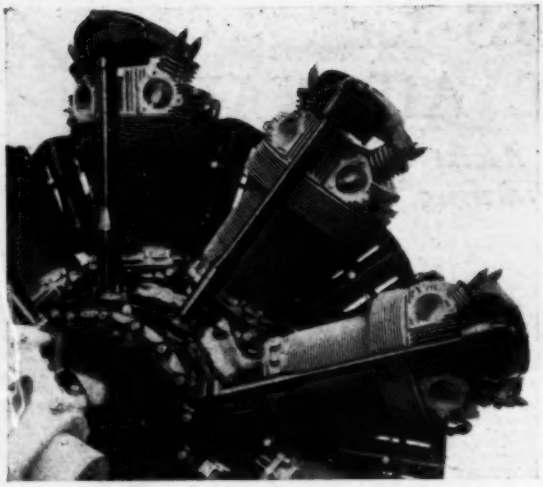
A smaller fourteen-cylinder type, the Panther X, is rated at 700 h.p. at 3,000 ft., and another model of the Panther, the Mk. VII (which operates on 77-octane fuel and not 87 as do the types already mentioned), delivers 560 h.p. at 12,000 ft. One of the most popular of the Siddeley types at the moment is the new seven-cylinder Cheetah IX, rated at 310 h.p. at 6,000 ft. This is the only current Siddeley model, apart from



The Siddeley Genet Major is available in direct drive and geared forms. The former version, shown here, is rated at 150 h.p.



This is the new British Salmson A.D.9R. Series III. Its normal output is 80 h.p. at 3,000 r.p.m. and the maximum 86 h.p. at 3,300 r.p.m.



The Short Empire boats will be fitted with Bristol Pegasus XC engines. The XC is the commercial version of the 840/975 h.p. Pegasus X which will power a number of new military types.

the Tiger IX and Panther X, to use 87-octane fuel. It is supplied only in direct-drive form. The cylinders are very similar in construction to those of the Tiger, but are of rather smaller bore. They may be regarded, in fact, as the cylinders of the Panther X.

The smallest engine now in production at the Siddeley works is the seven-cylinder Genet Major rated at 150 h.p. This model looks like a scaled-down version of the ever-popular Lynx, which, in its most widely used form, when it is known as the Mk. IVC, delivers a normal output of 215 h.p.

(Makers: Armstrong Siddeley Motors, Ltd., Parkside, Coventry.)

BRISTOL

The astoundingly high powers which are being taken from the current models of the Bristol Mercury and Pegasus nine-cylinder radials belie the statements that, where high outputs are concerned, the nine-cylinder engine is becoming obsolete. In the latest type Pegasus we have an engine delivering about 1,000 h.p. with eminent satisfaction: just how many more "horses" can be produced from the long-familiar nine Bristol "pots" remains to be seen.

The very latest types to be offered commercially are the Mercury Series VII, VIII, and IX and the Pegasus X, XI and XII. The new-type Mercury (the engines mentioned differ only in reduction gear ratio) gives an increase of nearly 30 per cent. in output compared with the Mercury VI, which it supersedes. It is relatively lighter in spite of increased power, and incorporates a number of up-to-date features such as provision for the De Havilland V.P. airscrew and long-chord controllable cowling combined with exhaust ring. These latter features, incidentally, are also standard on the latest Pegasus engines. The normal rated output of the new Mercury is 720 h.p. at 2,400 r.p.m., at 12,500 ft., and the maximum power available for level flight is 840 at 14,000 ft. The bare weight is only 980 lb.

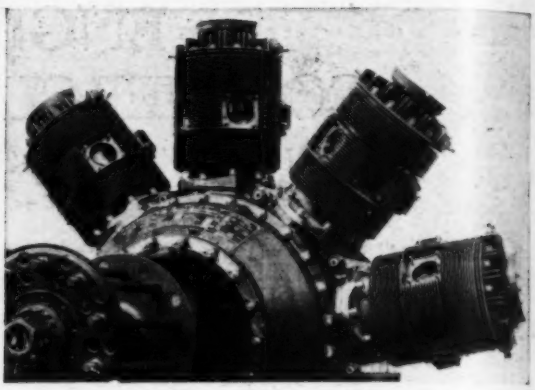
For their fleet of new Empire flying boats, Imperial Airways are specifying Pegasus XC engines. The XC is a commercial version of the Pegasus X (the XI and XII are similar to the latter model except for reduction gear ratio), but operates, like its military brothers, on fuel of 87 octane number. The new type of Pegasus is rated at 840 h.p. at 2,250 r.p.m., at 3,500ft., and gives no less than 975 h.p. for take-off when fitted with a V.P. airscrew. Of the Bristol sleeve valve engines which are awaited with such interest the two commercial types are the 500 h.p. Aquila and the 663/770 Perseus II.

(Makers: The Bristol Aeroplane Company, Ltd., Filton, Bristol.)

BRITISH SALMSON

Three basic models comprise the current British Salmson range, these being the 50h.p. A.D.9, and A.D.9R Series III (which is normally rated at 80 h.p. at 3,000 r.p.m., and gives 86 h.p. at 3,300), and the 150 h.p. A.C.9. In their main features these three engines are similar in construction but differ in size. Their weights are 160lb., 185lb., and 374lb. respectively. All are nine-cylinder radials, making for easy cooling and uniformity of torque.

(Makers: British Salmson Aero Engines, Ltd., Raynes Park, London, S.W.20.)



The Bristol civil-rated Aquila runs on fuel of 73 octane number and gives 500 h.p. This is claimed to be the first air-cooled sleeve valve engine to go into series production.

CIRRUS-HERMES

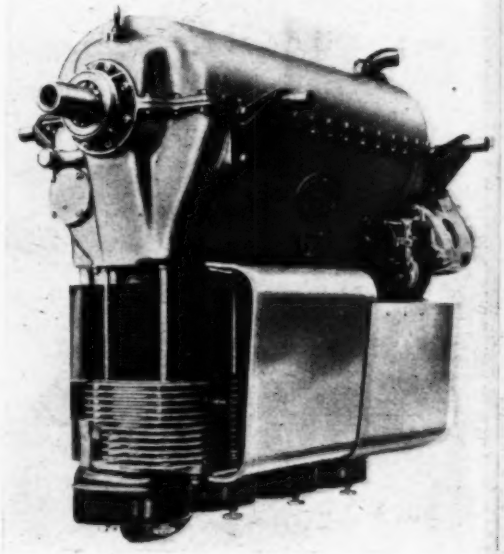
It is an interesting fact that two 82/90 h.p. Cirrus Minor engines consume no more petrol than one engine of the 125/135 h.p. Major type although they give a total output of 33½ more power Both these engines are four-cylinder-inverted-in-line types and weigh 195 lb. and 310 lb. respectively.

A batch of fifty Minor engines is now going through the shops and will be installed in light private-owner and commercial types. A small twin-engined cabin monoplane with a pair of Minors suggests itself as a good, economical proposition

(Makers: Cirrus-Hermes Engineering Co., Ltd., Brough, Yorks.)

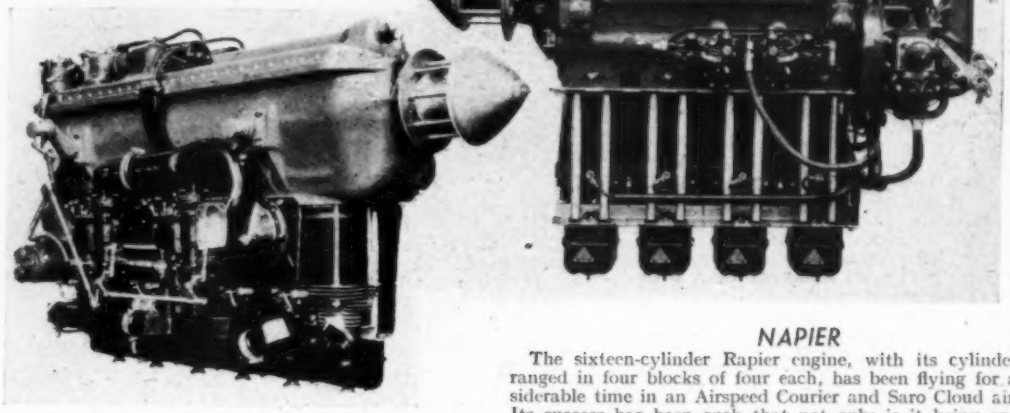
DE HAVILLAND

A very large percentage of the commercial machines being operated by British companies are fitted with De Havilland Gipsy engines of the Six or Major types. The Six is the more



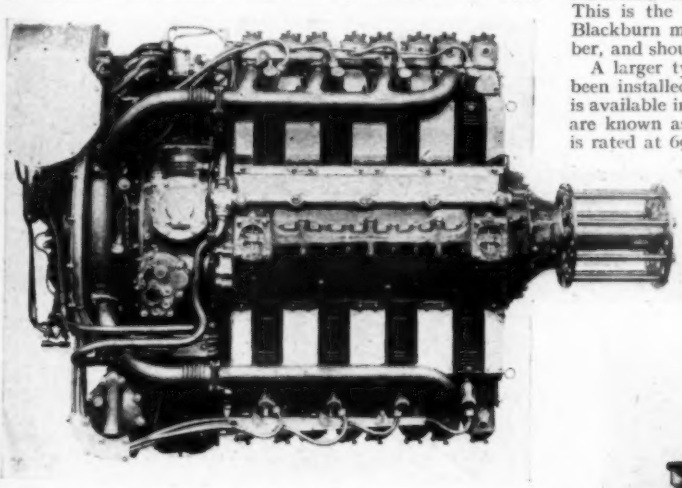
The 125/135 h.p. Cirrus Major is of the popular inverted four-cylinder-in-line type. Its small brother, the Minor, is of 90 h.p.

The D.H. Gipsy Six (left) will shortly appear in a new form. Rather more power will be available and there will be provision for the D.H. V.P. airscrew. The Gipsy Major (right) gives 130 h.p.



recent design and gives 200 h.p. from its six inverted air-cooled cylinders; the Major is similar in many respects but has four cylinders. Its power is 130 h.p. Top overhauls of the Major are unnecessary, and 750 hours may be run between complete overhauls.

A new version of the Six, designated the Gipsy Six Mk.II has been developed and should interest commercial operators, particularly because its design makes provision for the new De-Havilland variable-pitch airscrew, and because a higher continuous power is available. The new engine has a compression ratio of 6 : 1 compared with the standard ratio of 5.25 : 1. Fuel of a higher octane number than that specified for the Gipsy



The two most recent versions of the Napier Rapier available are the V and VI, giving 330/340 h.p. (max.) at 13,000 ft. and 360 h.p. at 4,000 ft respectively.

Six Mk.I will be used. Accordingly the cylinder heads are of a new aluminium type which will permit the use of leaded fuel. This, of course, will be a great advantage to operators in areas where high-octane fuel can be obtained most economically by the addition of tetra-ethyl lead.

Some idea of the benefits which may be conferred by this new engine can be gauged from the fact that the D.H.86A four-engined biplane will cruise at 155-160 when the Mk.II engines with V.P. airscrews are fitted, whereas with standard Gipsy Sixes driving fixed pitch airscrews the machine cruises at 140-145 m.p.h.

A vacuum pump is being incorporated to drive the gyros of blind-flying instruments.

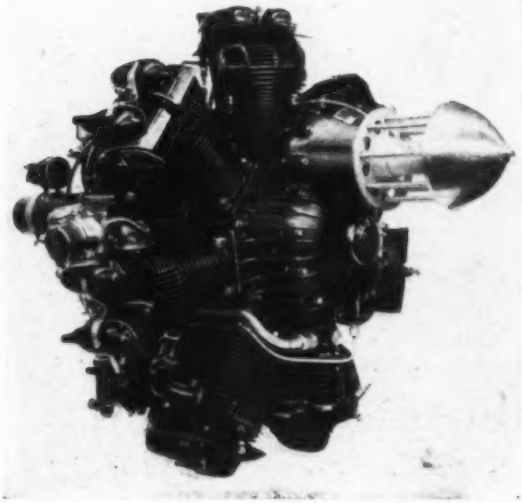
(*Makers: The De Havilland Aircraft Co., Ltd., Hatfield, Herts.*)

NAPIER

The sixteen-cylinder Rapier engine, with its cylinders arranged in four blocks of four each, has been flying for a considerable time in an Airspeed Courier and Saro Cloud aircraft. Its success has been such that not only is it being specified for the new Blackburn H.S.T.10 transport monoplane, but the upper component of the Short-Mayo "composite" machine for the transatlantic service will be fitted with four of these engines. The Rapiers in this particular machine are likely to be of the fully supercharged variety known as the Rapier V. This model has recently completed its type test and gives a maximum output of 330-340 h.p. at 4,000 r.p.m. at 13,000 ft. For take off at sea level the engine offers 325-335 h.p. at 3,500 r.p.m. Another current version of the Rapier, designated the Mk. VI, is a moderately supercharged engine rated at 360 h.p. at 3,500 r.p.m. at 4,000 ft., and delivering a maximum of 395 h.p. at its full-throttle height of 5,800 ft. This is the type of Rapier which is being used in the new Blackburn monoplane. It operates on fuel of 87 octane number, and should give the new machine a very high performance.

A larger type of Napier engine, and one which has not yet been installed in a commercial aeroplane, is the Dagger, which is available in fully and moderately supercharged forms. These are known as the Series II and III respectively. The former is rated at 695 h.p. at 10,000 ft. and the latter at 725 h.p. at 3,500 ft. Both operate on fuel of 87 octane number. The arrangement of the cylinders, of which there are twenty-four, is similar to that used for the Rapier.

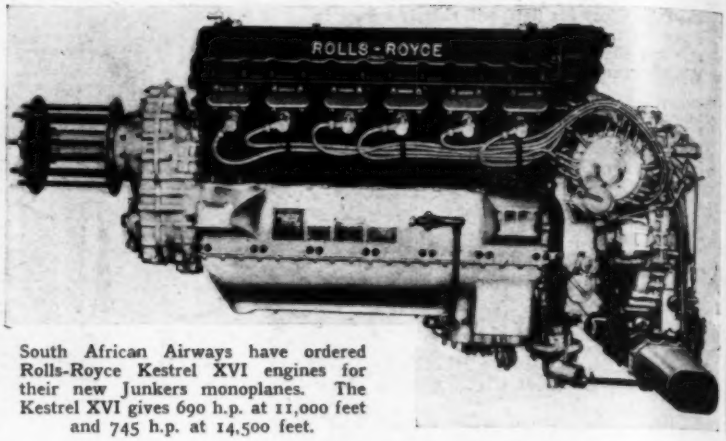
The latest version of the Pobjoy Niagara is the Mk. III, which gives 88/95 h.p. and weighs 156 lb.



The Napier company holds the licence in this country for the 720 h.p. Junkers six-cylinder compression-ignition engine.
(Makers: D. Napier and Son, Ltd., Acton.)

POBJOY

The Pobjoy Niagara engine, which is the most widely employed type in the Pobjoy range, particularly for commercial aircraft, is now being built in an improved form. Known as the Niagara Mk. III, this model incorporates an improved type of reduction gear, new piston and scraper rings, improved tappet housing and other detail refinements. A specially designed rubber-damped sub-mounting has been developed for the engine and a long chord cowling, which permits ready access to the engine, is supplied as standard. A seven-cylinder geared radial, the Niagara III is of 2,835 c.c. capacity and is rated at 88 h.p. at 3,300 r.p.m. The maximum power is 95 h.p. at 3,650 r.p.m. The remaining Pobjoy models are the 65/70 h.p. Cascade (a direct drive engine) and the 75-80 h.p. geared Cataract.
(Makers: Pobjoy Airmotors and Aircraft, Ltd., Rochester, Kent.)



South African Airways have ordered Rolls-Royce Kestrel XVI engines for their new Junkers monoplanes. The Kestrel XVI gives 690 h.p. at 11,000 feet and 745 h.p. at 14,500 feet.

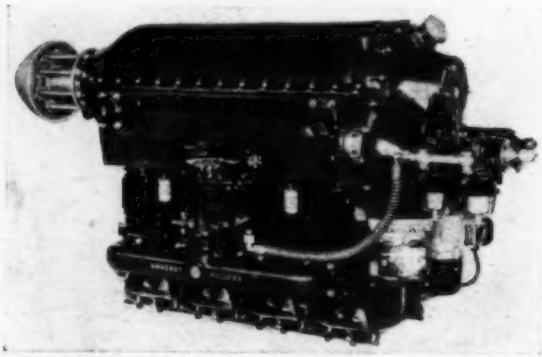
ROLLS-ROYCE

With the announcement that Kestrel engines will be fitted to the three new Junkers Ju. 86 high-speed transport monoplanes ordered by South African Airways, Rolls-Royce can be said to have re-entered the commercial field. Since the introduction of their outstandingly popular Kestrel a few years ago most of their business has been on the military side.

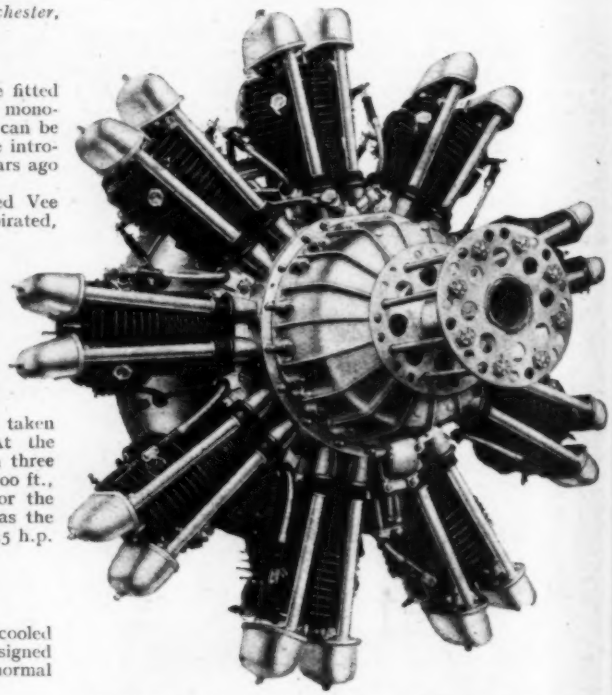
The Kestrel engine is a twelve-cylinder liquid-cooled Vee type geared engine, and can be supplied in naturally aspirated, medium supercharged, and fully supercharged forms. Originally water-cooled, the engine can employ glycol as a coolant or may alternatively be provided with a "composite cooling" system. This means that the engine is partially water- and partially steam-cooled. It is possible with this system to use a radiator which would normally be fitted to an engine of 25 per cent. less power. During a sustained climb, of course, this radiator is inadequate to dissipate all the heat generated, and steam is formed. This is led to a condenser where the steam is condensed and taken back, as water, into the main cooling system. At the moment the Kestrel is being supplied to the R.A.F. in three forms. These give 600 h.p. at 11,000 ft., 630 h.p. at 3,000 ft., and 570 h.p. at sea level respectively. The engine for the South African machines will be of a new type known as the Mk. XVI. This type gives 690 h.p. at 11,000 ft. and 745 h.p. at 14,500 ft.
(Makers: Rolls-Royce, Ltd., Derby.)

VILLIERS-HAY

A recently introduced light four-cylinder inverted air-cooled engine is the Villiers-Hay Maya. This unit has been designed to run for 1,000 hr. between major overhauls. Its normal rating is 120 h.p. at 2,300 r.p.m., and the maximum power 130 h.p. at 2,600 r.p.m. The weight is 275 lb.
(Makers: Villiers-Hay Development, Ltd., 48, Albemarle Street, London, W.1.)



A newcomer in the low-power class is the 120/130 h.p. Villiers-Hay Maya. It weighs 275 lb.



The 230/250 h.p. Scorpio is one of the three Wolseley types on the market at the moment. Other models are under development.

WOLSELEY

An extensive programme of radial engine development has been arranged by Wolseley Aero Engines, Ltd. The three models on the market at the present time are the Aquarius Mk. I, Aries Mk. III and Scorpio Mk. I. The former is a seven-cylinder type, but the two latter have nine cylinders. The normal rated powers, respectively, are 155, 205, and 230 h.p. The latest Wolseley type is the moderately supercharged Libra which delivers its maximum output of 505 h.p. at 7,200 ft. Other models, including powerful two-row types, are under development
(Makers: Wolseley Aero Engines, Ltd., Birmingham.)

EMPIRE AIR DAY

A Guide to Military and Civil Aerodromes Open to the Public on Saturday

NEXT Saturday, May 23, is Empire Air Day. Inaugurated in 1934, since when it has been an annual event, the day is organised by the Air League of the British Empire with the co-operation of the Air Ministry and various civil aerodrome authorities to afford the public an opportunity to become acquainted with British aviation. The proceeds are devoted to the R.A.F. Benevolent Fund. Car parking facilities are provided at the great majority of the aerodromes. The standard admission charge is one shilling for adults and threepence for children under fifteen.

The following lists include every aerodrome and works which, at the time of going to press, are known to be opening:

SERVICE AERODROMES

England

BEDFORDSHIRE: *Henlow.*—Work of home aircraft depot.

BERKSHIRE: *Abingdon.*—Dive bombing by Harts of Nos. 15 and 40 Squadrons; slow landings by Tutors; formation flying, stripped aircraft; parachutes, cameras, guns and bombs.

BUCKINGHAMSHIRE: *Halton.*—School for Technical Training of Apprentices; Princess Mary's R.A.F. Hospital; Insitute of Pathology and Tropical Medicine; formation flying and aerobatics; living quarters open.

CAMBRIDGESHIRE: *Duxford.*—Quick "get-away"; attack by fighters on a bomber; low flying attack on convoy; aerobatics and formation flying; parachute event; fights between Demon and Gauntlet; photographic and armament gear; towed target practice. *Sutton Bridge.*—No. 3 Armament Training Camp.

CHESHIRE: *Sealand.*—No. 5 Flying Training School.

DURHAM AND NORTHUMBERLAND: *Usworth.*—No. 607 (County of Durham) (B) Squadron.

ESSEX: *Hornchurch.*—Nos. 54, 65, and 74 (Fighter) Squadrons.

GLOUCESTERSHIRE AND SOMERSET: *Filton* (Bristol).—No. 501 (City of Bristol) (B) Squadron.

HAMPSHIRE: *Calshot.*—Aerobatics by Nimrod; attack by three fighters on drogue target; landings and take-offs by flying boats, float planes and amphibians; launching of Southampton; a Saro London will take part; armament, photographic equipment, etc., on view. *Farnborough.*—Dive bombing by six Audax against convoy; formation flying; artillery "shoot"; supply dropping; defence of infantry outpost against dive bombing attack; message picking-up; aerobatics by Fury and Gauntlet; parachutes, guns, cameras, etc. *Gosport.*—Aerobatics; formation flying by twelve Baffins of No. 810 Squadron; deck landing training; torpedo dropping; towed target; fly-past of Saro London and three Southamptons; Baffin, Vildebeest, Shark, Swordfish, Autogiro and Anson on view; armament training and photographic gear. *Lee-on-Solent.*—Attack by six Fairey III F's on a "Chinese junk manned by pirates"; aerobatics; supply dropping; towed target; formation flying. *Worthy Down.*—No. 7 (B) Squadron and No. 102 (B) Squadron.

KENT: *Biggin Hill.*—Quick "get-away"; low bombing; formation flying; aerobatics; radio-telephony communication. *Eastchurch.*—Work of the Air Armament School; armament training in the air. *Hawkinge.*—No. 2 (AC) Squadron: No. 25 F Squadron. *Manston.*—No. 3 School of Technical Training (Men); flying by the Ansons of No. 48 (GR) Squadron; No. 500 (County of Kent) (B) Squadron: School of Air Navigation.

LINCOLNSHIRE: *Cranwell.*—Formation flying by Harts and Tutors; message picking-up by Atlas; synchronised aerobatics, converging bombing and supply dropping; parachute display; Valentia "flying classroom,"; engines, parachutes, wireless, etc. *Digby.*—Aerobatics by Furies; combat between Fury and Harts; low bombing by Harts; air drill by Wallaces; message picking-up and dropping by two Audax; visit of Valentia and Heyford; armament, anti-gas section, parachutes, etc., on view. *Grantham.*—Synchronised aerobatics by Furies; message picking-up by Audax; blind take-off and flying; dummy parachute drop; anti-gas demonstration; armament, engines, etc. *North Coates.*—Aerobatics by Moth and two Furies; towed target; message picking-up; camera gun training; formation flying and dive bombing by Wallaces; armament engines, etc. *Waddington.*—No. 503 (County of Lincoln) (B) Squadron.

A Large-scale Battle

MIDDLESEX: *Hendon.*—Air Battle between eighteen machines from Nos. 600 (City of London) and 601 (City of London) (Fighter) Squadrons in conjunction with 11th London Regiment, Aircraft Brigade, Royal Artillery (Territorial Army); synchronised [illegible] by Harts; slow flying; fly past; exhibition park. *Northolt.*—Dog fight, dive bombing by squadron; aerobatics; towed target; oxygen apparatus, guns, cameras, parachutes, engines, etc.

NORFOLK: *Bircham Newton.*—Attack by three Hinds on Heyford with explanation by leader of his manœuvres; dive bombing; aerobatics; low bombing; set piece; towed target; blind flying; balloon bursting; crazy and inverted flying; Hart, Hind, Gordon, Fury, Heyford, Overstrand, and Tutor on show; armament and photography, parachutes, etc.

NORTHAMPTONSHIRE: *Peterborough.*—No. 7 Flying Training School.

NOTTINGHAMSHIRE AND DERBY: *Hucknall.*—Dog fight between 2-seater and single seater; aerobatics; formation flying; aerial gunnery; blind flying; armament, wireless, photography, etc.

OXFORDSHIRE: *Upper Heyford.*—Nos. 33, 57, 58, 215 and 218 (Bomber) Squadrons.

SURREY: *Kenley.*—Ground strafing; flight and squadron air drill; aerobatics; armament, wireless, parachutes, etc.

Empire Air Day aerodromes at a glance. Service stations are indicated by dots and civil aerodromes by crosses.

SHROPSHIRE: *Tern Hill.*—Formation flying by Harts and Audax; blind flying; message picking-up; synchronised aerobatics by Gauntlet; set piece; armament, photography, etc.

SUFFOLK: *Felixstowe.*—Aerobatics and formation flying by marine aircraft; lifting of flying boats by 50-ton crane; motor boat section; armoury, parachutes, etc. *Martlesham Heath.*—Exhibition of experimental types; dive bombing; aerobatics; demonstration by Supermarine fighter and Vickers Wellsley; armament, photography, parachutes, etc. *Mildenhall.*—Combat between two Gauntlets and Heyford; aerobatics by Gauntlet; formation flying by Heyfords; armament, wireless, parachutes, etc.

SUSSEX: *Tangmere.*—Aerobatics by Furies; low flying attack; formation flying; flight attack on towed target; parachutes, armament, etc.

WARWICKSHIRE AND STAFFORDSHIRE: *Castle Bromwich.*—Aerial combat; wireless communication; bombing and photography; armament, parachutes, etc.

WILTSHIRE: *Netheravon.*—No. 6 Flying Training School. *Old Sarum.*—picking-up and dropping messages; dive bombing; formation flying and aerobatics; fly-past; anti-gas event in co-operation with British Red Cross.

YORKSHIRE: *Catterick.*—No. 26 (AC) Squadron. *Thornaby.*—No. 608 (North Riding) (B) Squadron and No. 9 Flying Training School.

Scotland

ANGUS: *Montrose.*—Converging bombing; aerobatics; formation flying; supply dropping; armament, parachutes, etc.

FIFE: *Leuchars.*—No. 1 Flying Training School; Temporary Armament Training Camp.

MIDLOTHIAN: *Turnhouse.*—No. 603 (City of Edinburgh) (B) Squadron.

RENFREW: *Abbotsinch.*—No. 602 (City of Glasgow) (B) Squadron.

Ireland

ANTRIM: *Aldergrove.*—Air combat between heavy bomber and three fighters; air drill by nine Wallaces; bombing; aerobatics; dummy parachute drops; anti-gas measures, armament, parachutes, etc.

CIVIL AERODROMES AND FLYING TRAINING SCHOOLS

England

BERKSHIRE: Reading.

CAMBRIDGESHIRE: Fen Ditton.

CHESHIRE: Merseyside Air Park, Hooton.

CUMBERLAND: Carlisle Municipal Aerodrome.

DEVON: Barnstaple and North Devon Aerodrome.

ESSEX: Broxbourne Aerodrome, Nazeing; Southend Airport.

GLOUCESTERSHIRE AND SOMERSET: Bristol Airport; Churchdown Aerodrome, Gloucester.

HANTS: Christchurch; Bournemouth; Hamble; Portsmouth City Airport; Southampton Airport.

HERTS: Hatfield.

ISLE OF WIGHT: Ryde Aerodrome; Saunders Roe Works.

KENT: Gravesend Airport: Lympne Airport.

LANCS: Birkdale Sands Landing Ground, Southport; Hesketh Park Aerodrome, Southport; Manchester Airport; Stanley Park Aerodrome, Blackpool.

LEICESTERSHIRE: Desford; Leicester Airport.

LINCOLN: Grimsby Airport.

[*Cont. overleaf.*

MIDDLESEX: Hanworth Aerodrome; Heston Airport.
NORFOLK: Norwich Municipal Aerodrome.
NORTHAMPTONSHIRE: Sywell.
NORTHUMBERLAND: Woolsington Aerodrome, Newcastle-on-Tyne.
NOTTINGHAMSHIRE: Tollerton Aerodrome, Nottingham.
OXFORDSHIRE: Witney Aerodrome.
STAFFORDSHIRE: Stoke-on-Trent City Aerodrome, Mier.
SURREY: Brooklands; Redhill.
SUSSEX: Brighton, Hove and Worthing Airport; Ford Aerodrome; Wilmington Aerodrome, Eastbourne.
WARWICKSHIRE: Whitley Aerodrome, Coventry.
YORKSHIRE: Hull Municipal Airport; Leeds-Bradford Municipal Aerodrome; Brough; Sherburn-in-Elmet.

Scotland

AYRSHIRE: Prestwick.
EDINBURGH: Macmerry Aerodrome, Edinburgh.
PERTHSHIRE: Perth.

* * *

The Cinque Ports Flying Club are sending joy-ride machines to Hawkinge, Kent, and the entire display will take place at the latter aerodrome.

Proposals have been made for a display by Plymouth Airport as Roborough at Milton Batten is not opening.

Bekesbourne Aerodrome, Canterbury, will not be open (as previously announced) as the machines will be staging a display at Manston, Kent.

Ards Airport, Newtownards, Co. Down, and Gatwick Airport, Horley, are not able to open on Empire Air Day as previously announced.

THE INDUSTRY

Airscrew Company's Issue

APPLICATION has been made to the Stock Exchange to deal in the shares of the Airscrew Company, Ltd., of Weybridge, whose products—wooden airscrews with the Schwarz patent finish—need no introduction to readers of *Flight*.

Converted last month from a private into a public concern, the company has recently made a private placing of shares. The proceeds of the issue were £131,250. The company's business greatly increased as a result, *inter alia*, of the Royal Air Force expansion. For the year to March 31, profits were £16,993, while, including the newly issued shares, the share capital is now £159,000, divided into 100,000 six per cent. cumulative preference shares of £1 and £59,000 in ordinary shares of 2s. It is expected that the output for the current year will more than doube that of last year.

Home from Australia

MR. C. GIBSON, resident manager in Australia to British Timken, Limited, Birmingham, has returned to England after two and a half years absence.

He will be returning again after two months stay and will be glad to hear from his old friends during this period.

Satin Silver Surfaces

IT is now a generally known fact that high speed in aircraft is obtained by aerodynamical "cleanliness" not only in respect of external form and items of equipment, but also in the very smallest details, even down to the nature of the surface finish; a truly smooth finish, apart from its pleasing appearance, can contribute quite a number of miles per hour.

This desirable state of affairs, in the case of coloured finishes, is obtainable with the aid of such products as Titanine "satin" finish; but securing a truly smooth surface with a silver finish has been a less simple matter, unless a transparent varnish final coating is used—a process which, besides spoiling to a large extent the desired metallic appearance, also gives less protection by virtue of the poorer durability of the average transparent coating employed for these purposes.

Now, however, Titanine Emaillite, Ltd., of Colindale, London, N.W., produce a "satin finish" silver which can be sprayed on to the suitably prepared surface of fabric, wood or metal, and which, without any subsequent treatment, gives a surface which is stated to be of the same degree of smoothness as the much-admired high-gloss coloured finishes.

Incidentally, Titanine dope is now the standard finish on practically all the civil aircraft manufactured in this country, and Titanine finishes are used on the machines operated by every regular air transport company operating in Great Britain and Northern Ireland.

INCREASES OF CAPITAL

EXACTOR CONTROL CO. LTD. (Dorland House, Regent Street, London, S.W.1).—The nominal capital has been increased by the addition of £1,250 beyond the registered capital of £3,000. The additional capital is divided into 1,250 6 per cent. cumulative preference shares of £1 each.

ATLAS AIR SERVICES LTD. (164, Aldersgate, London, E.C.1).—The nominal capital has been increased by the addition of £8,000 beyond the registered capital of £2,000. The additional capital is divided into 8,000 6 per cent. redeemable preference shares of £1.

MARTIN-BAKER AIRCRAFT COMPANY LTD. (Martin-Baker Aircraft Works, Higher Denham, Bucks).—The nominal capital has been increased by the addition of £4,500 in £1 ordinary shares beyond the registered capital of £19,500.

PHILLIPS AND POWIS AIRCRAFT LTD. (The Aerodrome, Woodley, Reading).—The nominal capital has been increased by the addition of £125,000 beyond the registered capital of £125,000. The additional capital is divided into 500,000 5½ per cent. cumulative convertible preference shares of 5s. each.

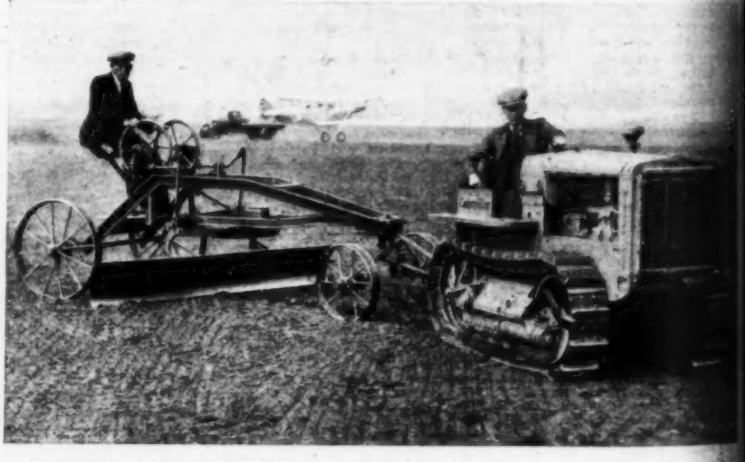
NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

BRITISH AND COLONIAL AEROPLANE CO. (1936), LTD. was registered as a "private" company on May 11, with a nominal capital of £100 in £1 shares. Objects: to carry on the business of manufacturers of and dealer in aircraft of all kinds, aeronautical apparatus, ships, garage and hangar keepers, etc. The first directors are: William G. V. Smith, company director; Sydney E. Smith, Sir George S. Smith and Herbert J. Thomas. Secretary: R. D. Marel. Solicitors: Stanley, Washbourn and Co., 51, Corn Street, Bristol.

CHANNEL AIR FERRIES LTD., was registered as a private company on May 8, with a nominal capital of £5,000 in £1 shares. Objects; to operate air services, etc. The first directors are to be appointed by the subscribers. Solicitors: Wm. Easton and Sons, 43, London Wall, E.C.2.

BRITISH ETHYL CORPORATION LTD. was registered as a private company on May 9, with a nominal capital of £100 in £1 shares. Objects: to carry on the business of manufacturers and sellers of tetraethyl lead and ethyl fluid in the U.K. Directors: James W. Armit, Thomas R. A. Bevan. Registered office: Thames House, Millbank London, S.W.1.



A BROOKLANDS SIDELIGHT: The aerodrome is being considerably improved and extended, and in this view a "Caterpillar" tractor is seen hauling a grader on the job. It is not generally known that the term "Caterpillar" is strictly applicable to this one particular make of tractor, which is handled by Jack Olding, Ltd., 8, North Audley Street, London, W.1. The "Twenty-two," shown in this picture, is particularly suitable for aerodrome preparation and for aircraft haulage; it gives 25 drawbar h.p., and has a maximum pull of 5,290 lb. (low) or 2,460 lb. (top). The Brooklands reconstruction, incidentally, is being carried out by En-Tout-Cas, Ltd.

BOWATER